Fig. 1

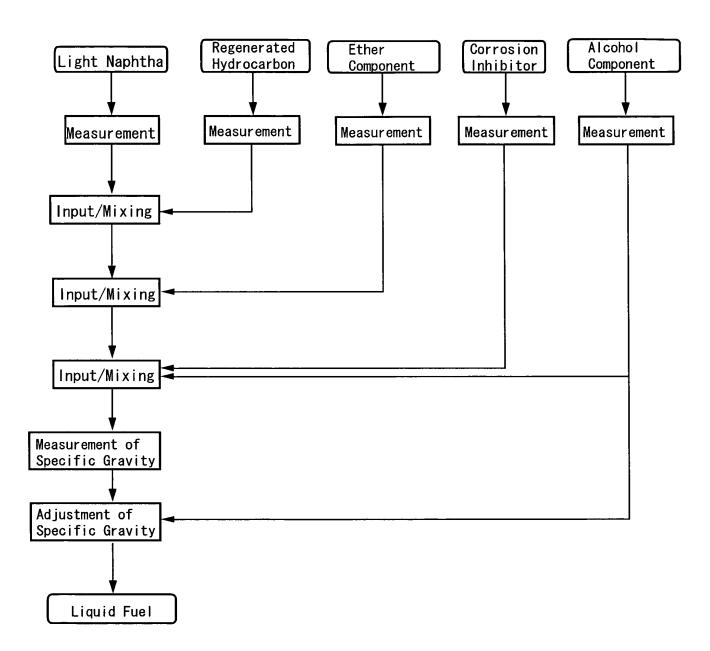
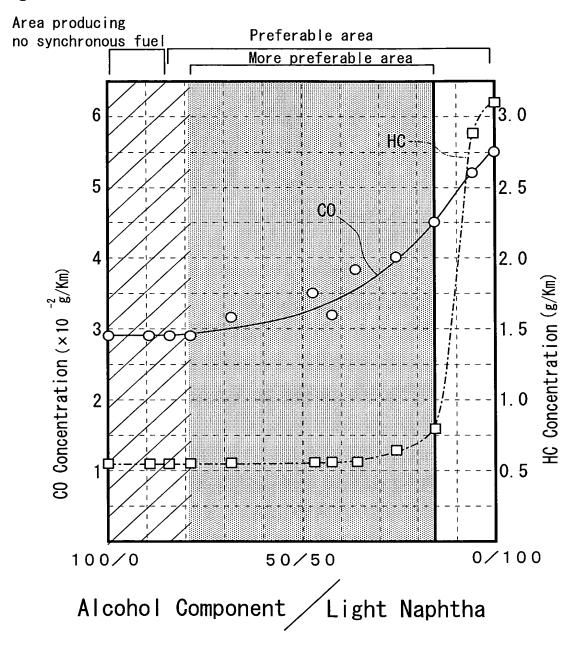


Fig. 2



Mixing Ratio (Alcohol/Ether/Naphtha)	100/0/0	85/5/10	80/5/15	75/5/20	65/5/30	40/5/55	45/5/50	35/5/60	25/5/70	15/5/80	5/5/90	0/0/100
Ratio (Alcohoi/Naphtha)	100/0	89. 5/10. 5	84. 2/15. 8	78. 9/21. 1	68. 4/31. 6	42. 1/57. 9	47. 4/52. 6	36. 8/63. 2	26. 3/73. 7	15. 8/84. 2	5. 3/94. 7	0/100
HC Concentration (g/Km)	1. 120	1. 121	1. 121	1. 122	1. 126	1. 129	1. 129	1. 143	1. 253	1. 578	2. 889	3. 054
Co Concentration (g/Km)	0. 029	0. 029	0. 029	0. 029	0. 032	0. 032	0. 035	0. 038	0. 040	0. 045	0. 051	0. 055

<Ether Nonloaded Type>

Designation			Fuel C	ompositio	1		
of					Alcohol		
Formulation	Naphtha	Ether	Ethanol	ΙPΑ	n B A	ΙBΑ	1-Pentanol
E 2	98		2				
E 1 0	90		10				
E 2 0	80		20				
E 5 0	50		50				
IN40	60			20	20		
IN15	85			10	5		
IN75	25			35	40		
EIB40	60		20			20	
EIB15	85		5			10	
EIB75	25		35			40	
P N B 3 0	70			10	10	10	
PNB15	85			5	5	5	
PNB75	25			25	25	25	
EIPP30	70		10	10			10
EIPP15	85		5	5			5
EIPP75	25		25	25			25

<Ether Loaded Type>

Designation			Fuel 0	composition	n		
of		Eu			Alcohol		
Formulation	Naphtha	Ether	Ethanol	ΙPΑ	nВА	IBA	1-Pentano I
E 1 0 - E	85	5	10				
E 2 0 - E	70	10	20				· 1
E 5 0 - E	20	30	50				
IN40-E	30	30		20	20		
IN15-E	80	5		10	5		
IN75-E	20	5		35	40		
E I B 4 0 - E	30	30	20			20	
E I B 1 5 - E	80	5	5			10	ļ
E I B 7 5 - E	20	5	35			40	1
PNB30-E	40	30		10	10	10	
PNB15-E	80	5		5	5	5	1
PNB75-E	20	5		25	25	25	
E I P P 3 0 - E	40	30	10	10			10
EIPP15-E	80	5	5	5			5
EIPP75-E	20	5	25	25			25

*1 100 -Perfectly phase-solved, 0 -Layer-separated

1		Fue	Composit	ition (wt%)	vt%)		Additive	tive	Water	Alumin	Aluminum Corrosion Test	on Test	Stability of Fuel*1	of Fuel*1
Designation of	HC						Kind	Loading/Fuel	Loading/Fuel Loading/Fuel	Evaluation	Evaluation	Weight Loss	Room Temp. Low Temp.	Low Temp.
Formulation	Naphtha	=	NPA	IPA	NBAI	BA		(wt%)	(WT%)	(ූ (ූ (ක්	Time (hr.)	Kate (%)	2 62) -10-
E 10	90.0	10.0					None		0.0	100	120	က င	100	100
		· ·					auga		•	2) 1	,	}))
	90.0	10.0					None		0.0	120	24	100	100	100
	89.6	10.0					None		0.4	120	24	0	100	0
	89.6	10.0					None		0.5	120	24	0	0	0
E 10-Me	89.6	10.0					Methanol	0.4	0.0	100	24	0	100	100
	89.6	10.0						0.5	0.0	120	24	0	100	100
E 10-PG	89.6	10.0				A.	Propylene glycol	0.4	0.0	100	24	0	100	100
	89.6	10.0						0.5	0.0	120	24	0	100	100
E 10-DEK	86.9 88.6	9.7					Diethyl ketone	3.5	0.0	100 100	24 24	0	100	100
	86.0	9.6						4.5	0.0	120	24	0	100	100
	88. I 89. 6	9.8 10.0							0.2	120	24	0	100	100
	85. 1 84. 2	9.5			4	<u>-</u>		5.0 6.0	0.4	120 120	24 24	0 0	100	100
E 10-GE	87.3 88.1	9.7					Ethy! formate	3.0	0.0	100 100	24 24	0	100	100
	86.4	9.6						4.0	0.0	120 120	24 24	0	100	100
	88.9								0.5	120	24	00	100	100
	83.3							7.0	0.5	120	24	0	100	0
E10-PA	88. 7 89. 0	9.9					Propional dehyde	1.5	0.0	100 100	24 24	0	100	100 100
	88.2								0.0	120	24	0	100	100
	89.0							1.0	0.1	120	24	0	100	100
	89.4	9.9						0.5	0.5	120	24	-	001	100
	85. 1							5.0	0.5	120	24	0	100	0

			,									1 () /5 39() 8 (
of Fuel*1	Low Temp.	100	100 0 0	100	100	100	100	100	100 100 100	100	100 100 100 0	100	100 100 100 0	
Stability of Fuel*1	Room Temp. Low Temp.	100	100 100 0	100	100	100	100	100	100	100	100 100 100 100	100	100 100 100 100	0 →Layer-
on Test	Weight Loss	7 0	100	0	0	0	0	0	0000	0	00000	0	0 0 0 0	*1 100 →Perfectly phase-solved, 0 →Layer-separated
Aluminum Corrosion Test	Evaluation Time (hr)	120	24 24 24	24	24	24	24	24 24	22 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	24 24	2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	24 24	24 24 24 24	→Perfectly
Alumin	Evaluation		120 120 120	100	120	100	120	100	120 120 120 120	100	120 120 120 120 120	100	120 120 120 120 120	*1 100
Water	Loading/Fuel	0.0	0.0 0.9 1.1	0.0	0.0	0.0	0.0	0.0	0.00		0.0 0.1 0.2 0.9	0.0	0.0 0.1 0.2 0.9 1.1	
ive	Loading/Fuel	(M.L.0)		0.5	0.5	0.5	0.5	3.0	0.2.0 0.3.0 0.3.0		8. 4. 2. 9. 8. 0. 0. 0. 0.	2.0	2.5 1.0 0.5 3.0 4.0	
Additive	Kind	None	None None	Methanol		Ethylene glycol		Acetone		Methy! formate		Butylaldehyde		
	1 4	<u>-</u>												
tion (wt%)	Al cohol													
Fuel Composition (wt%)	A	NFA	0.8.8.	6.	6.	6.	6.	. 4	29587	t 80 4	47997	9.8	0 2 2 2 2 2	
	1	80. 0 20. 0 79. 9 20. 0	80. 0 20. 79. 3 19. 79. 1 19.	79.6 19.	79.6 19.	79.6 19.	79.6 19.	77.6 19. 78.7 19.	76.8 19. 78.3 19. 79.6 19.	2 2 2	73. 6 18. 76. 7 19. 78. 2 19. 74. 5 18. 72. 72. 7	78.4 19. 79.1 19.	78. 0 19. 79. 1 19. 79. 4 19. 75. 9 19.	
Decionation	Formulation			E 20-Me		E 20-EG		E20-Ac		E20-GM		E 20-BA		

Stability of Fuel*1 Low Temp. -10°C 100 00000 000 100 100 100 100 100 00000 00000 Room Temp. 25°C 001 001 100 100 00000 00000 8 8 8888 001 9 8 000 Weight Loss Rate (%) 100 0 0000 Aluminum Corrosion Test 0 0 00000 0 00000 00000 Evaluation Time (hr) $\frac{120}{120}$ 24 24 24 24 24 24 24 24 24 24 24 2222 4224 4244 4244 24 24 24 24 24 24 24 24 Evaluation Form (C) 100 100 100 120 120 120 120 100 120 120 120 120 120 120 120 120 120 120 88 120 120 120 120 120 120 Loading/Fuel (wt%) Water 0.0 0 1 2 4 9 0. 0000000 o o 0000000 00 0 6 6 o. ö o. 0000000 Loading/Fuel (wt%) 00000 1.0 1.0 0 0 0 4 0 0 0 $\frac{3.0}{1.5}$ 4.0 2.0 1.0 2.0 3.0 ö ö 5. 4. 4. 6. 7 20.05 9. % Additive Ethyl formate Acetaldehyde ethyl Ethylene glyco Kind None None None None Methy! ketone ΒA NBA Composition (wt%) I P A cohol NPA Fuel 00 230 00 0 0 2 2 4 2 4 3 2 0 53000 മ 0 0 4 8 2 50. 50. 47. 49. 45. 50. 48. 49. 49. 49. 49. 48. 49. 47. 48. 45. 48. 46. 45. 48. 49. 48. 49. 47. 50.0 49.9 0 8 2 S 2 00 0 0 2 8 2 0 0 0 0 0 0 0 0 0 4 8 6 7 5 2 47. 49. 49. 45. 44. 50. 48. 48. 49. 49. 49. 49. 48. 49. 47. 45. 48. 46. 48. 49. 48. 49. 47. Designation of Formulation E 50-MEK E 50-CE Fig. 6 E 50-Me E 50-EG E 50-AA E 50

*1 100 →Perfectly phase-solved, 0 →Layer-separated

Temp Low Temp. Stability of Fuel*1 000000 88 800 001 001 888 88 800 88 00 I 88880 88 800 88 880 88 88 100 88 88888 88 888 88 00 I 00 I 88888 888 000 Weight | Rate (% 00000 00 000 00 00 00 00000 0 000 00 Aluminum Corrosion Test Evaluation Time (hr) 222 24 24 44 44 22 22 24 24 24 24 24 24 24 222222 24 24 24 24 44 Evaluation Temp. (°C) 100 100 120 120 120 88 001 120 120 120 120 120 001 120 120 120 88 20 20 20 20 20 90 90 120 120 120 120 120 Loading/Fuel Water 0 9 8 02 02408 0 0 2 4 0 9 & 0 2 8 9 8 0 -0 1 2 00000 00 0000000 00000 સંસ 0000000 00 000 Loading/Fuel 0000 000 00 യ 00200 8 2 -ကြလ 527 1.0.1.5 000 00 2 8 - 0 8. 2. . . 3.20.3 00 000 Additive Methy! formate glycol Butylaldehyde Methanol Acetone Kind None None None **Ethy** lene m 0 230 ထ တ ~ 8 8 - 8 ~ ∞ 4 4 7 00 00 6 9 ~ ∞ 48869 ი ი 000 20. 20. 19. 19. 19. 9.00.00 9 9 9 8 8 19. 19. 9.619.81 . 19. 9.00 200 20.0 666 20. 20. 20. 19. 19. 19. 19. 19. 18. 19. 19. 19. 20. 20. 18. 18. 9. 9.9.9.8 19. 19. 19. 19. 20. 20. 哥哥 Ethanol 0 8 1 9 22230 2 - 2 00 6 2 96532 $\infty \infty$ ~ ∞ ∞ 0 — თ 9 6 59. 59. 59. 59. 60. 59. 59. 59. 57. 58. 59. 56. 55. 59. 59. 58. 59. 56. 55. 59. 59. 59. 59. 60. 57. 57. 59 59. Designation Formulation N40-Me N40-E N40-BA N40-Ac I N40-GM ₽

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*1 100 →Perfectly phase-solved, 0 →Layer-separated

_															:					7	n	53	90	8	
of Fuel*1	Low Temp.	-10° C	100	100	0 (0	100 100	100	100	100	0 0	100	100	100	100	100	100	100	100	100	100	100	100	100	0 →Layer-separated
Stability	Room Temp.	25° C	100	100	100	0	100 100	100	100	100	100	100 100	100	100	100	100	100	100	100	001	100	100	100		
ion Test	Evaluation Evaluation Weight Loss	nate (A)	0 0	100	0 0	0	0	0	0	0 0	00	00	0	00	00	00	00	00	0 (00	00	00	00	0	*1 100 -Perfectly phase-solved.
num Corros	Evaluation	IIIIe (hr.)	24 24	24	24	24	24 24	24	24	24	24	24 24	24	24	24 24	24 24	24 24	24 24	24	2. 2. 4. 4.	24 24	24 24	24 24	24	0 →Perfect
Alum			06 06	120	120	120	100 100	120	120	120	120	100	120	120 120	100	120 120	120 120	100 100	120	120	120	100	120	120	¥
Water	Loading/Fuel	(WT%)	0.0		0.6		0.0 0.2				9 . 9 . 9 . 9 .	0.0		0.2	0.0	0.0	0.6 0.8	0.0		0.0	0.6	0.0	0.0	0.2	
Additive	Loading/Fuel	(MC%)					0.5 0.3				0.1	2.0	4.0	2.0	0.3	0.5	0.5	1. 0 0. 6	5.0			0.2	0.4	0.1	
Ad	Kind	N I I	None	None	None	MOTIC	Methanol					Propylene glycol			Methyl isobutyl			Ethyl formate				Propionaldehyde			
	¢	IBA																							
(wt%)	4	NBA	5.0		5.0		5.0 5.0				4.9	4.9		4.9	5.0	5.0	4.9	5.0			4.8	5.0	5.0		
Composition	Al coho!	I P A	10.0	10.0	9.9	9.9	10.0 10.0	9.6	6.6	9.9		9.6 9.9	9.6	9.8	10. 0 10. 0	10.0 10.0	9.9	9.9 9.9	9.5	დ ი ი	9.5	10.0	10.0	10.0	
		NPA																							
Fuel	17.	Ethanol														_									
	H C	Napricha	85. U 84. 9	85.0	84.5	84.3	84.6 84.6	83. 7	84.2	84.3	84. I 83. 5	83.3 84.0	81.6	83. 1 83. 8	84.7 84.7	84. 6 84. 7	84. 1 83. 5	84. 2 84. 4	80.8	83.1	81. 1 80. 1	84. 8 84. 8	84. 7	84.7	
Designation	of HC	rormulation	1 N 15				I N15-Me					I N15-PG			I N15-MBK			I N15-GE				I N15-PA			

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Decignation		Fue	Compositio	sitio	n (wt%)		Addi	Additive	Water	Aluminum	um Corrosion	ion Test	Stability	of Fuel*1
of	HC		A	cohol			Kind	Loading/Fuel	Loading/Fuel	atior	Evaluation	Weight Loss	Room Temp.	Low Temp.
Formulation		Ethanol	NPA		NBA	I BA		(wt%)	(wt%)	ତ୍ର	Time (hr)	Rate (%)	33	-10° C
I N75	25.0			0	40.0		None		0.0	06	24	100	100	100
	25.0			35. 0 34. 9	39.9		None		0. I 0. 2	06 6	24	001	001	00 1
	;			,			200		1		í I	,		
	25.0			35.0	40.0		None		0.0	120	24	100	100	00 0
				0 10	39.7		None			120	24	0	100	100
I N75-Me	24.8			34. 7	39. 6		Methanol	1.0	0.0	100	24	0	100	100
										100	24	0	100	100
	24.5			34.3	39.2	-		2.0	0.0	120	24	00	100	100
			···········	۰ ۲						120	24	> •	100	100
I N75-E G	24. 3 24. 4			34. 0 34. 2	38. 8 39. 1		Ethylene glycol	3.0	0.0	100	24 24	00	100 100	100
				5	37.6			0,9		120	24	0	100	100
	23.9			33.5	38.3			9.4.0	်ဝင်	120	22.5	000	001	001
				-						120	74	0	001	100
I N75-MPK	25. 0 25. 0			34. 9 34. 9	39.9 39.9	_	Methyl-n- propyl ketone	0. 2 0. 1	0.0	100 100	24 24	0	100 100	100 100 ·
	25.0			34.9	39.9			0.2	0.0	120	24	0	100	100
				6	39. 9				0. 1	120	24	0	100	0 <u>,</u>
I N75-GE	24. 5 24. 7			34. 3 34. 6	39.2 39.6		Methyl formate	2. 0 1. 0	0.0	100 100	24 24	0 0	100 100	100
	24. 1			∞	38.6					120	24	0	100	100
	24.6			34. 4	39.3			1.5	0.0	120	24	00	100	100
	7.4.			,						160	‡ *	0	100	201
I N75-A A	24.9 24.9			34.9 34.9	39.9 39.9		Acetaldehyde	0.3	0.0 0.1	100 100	24 24	0	100 100	100 100
				∞	39.8				0.0	120	24	0	100	100
	24.9			34.9	39.8			0.3	0.1	120	24	0	100	100
			-	6	36.8 8.6				0.5	120	24	0	100	100
										*	100 →Perfect	*1 100 →Perfectly phase-solved. 0 →Layer-separated	. 0 →Layer	-separated

Designation		Fuel	Composition		(wt%)		Add	Additive	Water	Alumin	Aluminum Corrosion Test	ion Test	Stability of Fuel*	of Fuel*1
of	HC		V				Kind	Loading/Fue!	Loading/Fuel	Evaluation	EvaluationEvaluation		Room	Low Temp.
Formulation	Naphtha		NPA	IPA	NBA	I BA		(WT%)	(WT%)	Temp (ී)	Time (hr)	Ege Bate	25° C	-10° C
E I B 40	60.0	20.0				20.0	None		0.0	06	24	100	100	001
						·	5		;	}	;	- 	2	?
	0.09	20.0				20.0	None		0.0	120	24	100	100	100
	57.1	19.0				0.61	None		8.4 - 2	120	24	0 0	100	00
	90.9	19.0				13.0	2101			160	15		>	>
E I B 40-Me	59. 1	19.7				19. 7	Methanol	1.5	0.0	100	24	0 0	100	100
	59. 2	19. 7						ж Э		8	6 2	>	001	001
	58.8	19.6				19. 6		2.0	0.0	120	24	0	100	100
	59. 1	19. 7				19. 7		1.0	0.5	120	24	0 (100	001
	59. 1	19. 7				19. 7		0.5	1.0	120	24	0	100	100
E I B40-EG	59.4	19.8				19.8	Ethylene	1.0	0.0	100	24	0	100	100
		2:0					<u>.</u>	- ;		2		·	:	
	58.8	19.6				19.6		2.0		120	24	00	001	100
	58. 9 59. 1	19. 6 19. 7	·			19. b		l. 5 l. 0	0.5 0.5	120 120	24	00	3 8	001
ı٠				\dagger	1	- 6		G G	c c	5	Š			9
E I B40-Ac	50.0	50.0 20.0				20.0	Acetone	0.0	o	100	24	00	100	100
	<u>.</u>	<u>;</u>				<u> </u>		:						
	58.2	19.4				19.4		3.0		120	24	0 0	100	100
	59.3	9. 0. 0. 0.				× 0		0.2		120	24	00	001	100
	55.3	18.4				18.4		3.0		120	24	0	100	100
	54.5	18.2				18. 2		4.0		120	24	0	100	0
E I B 40-GM	58.5	19.5				19.5	Methyl	2.5	0.0	100	24	0 0	100	100
	28.0						ומופרפ			201	F,	>	201	201
-	57.0	19.0				19.0		5.0		120	24	0 1	100	100
	58.7	19.6				19.6		2.0		120	24	00	001	100
	55.9	18.6				18.6		2.0	8.4	120	24	0	100	100
	55. 1	18.4				18.4		3.0		120	24	0	001	0
E I B 40-BA	59.6 59.6	119.9				19.9 E	Butylaidehyde	0.6	0.0	100	24	0	100	100
								;	S	2	<u> </u>	·		
	59.4	19.8				8.61		0.0	0.0	120	24	00	100	100
	59.0 59.3	. 6 . 8				19.8		0.0	. o.1	120	24	0	100	100
	56. 5 55. 7	18.8 18.6				18.8 18.6		1.0	4.8 5.1	120 120	24 24	00	100	000
					1	1								
									*	۲. 100 ± Pe	*1 100 →Perfectly phase-solved.	se-solved, 0	→Layer-	0 →Layer-separated

Designation		Fuel	Composition		(wt%)		Additive	ive	Water	Aluminum	IM Corros	Corrosion Test	Stability	of Fuel*1
	HC CHOCK	[+hone]	Alc		4 6 14	0	Kind	Loading/Fuel	Loading/Fuel	Evaluation	Evaluation Evaluation	Weight Loss	-	Low Temp.
FIRIT	Naphuna 85 0	E Linanoi	NFA	A A		1 B A	Τ	(MLA)	(ארש)	() () ()	74 (nr.)	rate (%)	Ľ	001
210111	84.9	. v.				10.0	None		0. i	06	24	? o	001	100
	25	C.				0 01	None			120	24	001	100	100
	84.5	5.0				9.9	None		0.6	120	24	0	001	0
	84.3	5.0				6.6	None			120	24	0	0	0
EIB15-Me	84. 2	5.0				9.9	Methanol	1.0	0.0	100	24	0	100	100
	84. 3									901	7.4	- -	100	001
	83. 7								0.0	120	24	0	100	100
	84.0	4.9				9.9			0.4	120	24	0	001	100
	83.0	4.9				6. 8. 8.		1. 5 1. 5	. s . o	120	24		001	30
EIB15-PG	83.7	4.9		<u> </u>		6.6	Propy lene	1.5	0.0	001	24	ő	100	100
	84. 2						grycor			001	5.4	>	901	001
	82. 5						-			120	24	0	100	100
	83. 0 83. 7	4.9				သ တ တ	•	1.0	0. 5 0. 0.	120	24 24	00	001	001
EIB15-DEK	84. 2	5.0				6.6	Diethyl ketone	1.0	0.0	100	24	0	100	100
						0.01				100	24	0	100	100
	83.7					6.6			0.0	120	24	00	001	100
	84.6					. 0.0 10.0				120	24	00	100	100
	82.4	8.4				9.7		9.53 52.53	9.0	120	24	00	001	000
	01. 0					·;				031	1.7	>	2	>
E I B15-SM	83. 3 83. 9	4.9 4.9				9.8	Methyl acetate	2. 0 1. 0	0.0 0.3	001 100	24 24	00	001	8 8
	82. 5									120	24	0	100	100
	83.6	4.9								120	24	00	001	0 C
	81.9	. 8 .				9 6 6		0.6	0.6	120	24		001	001
	80.9									120	£2	>	001	>
EIB15-PA	84. 5 84. 7	5.0 5.0				9.9 10.0	Propionaldehyde	0.6	0.0	001 100	24 24	0	100	100
	84.2									120	24	0	100	100
	84. 5 84. 5	5.0				6.6 6.6		0.4	0.2 0.4	120	24	00	100	0 0
										k1 100 →Pe	*1 100 →Perfectly phase-solved.		0 →Layer-separated	sparated

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2 Designation		Fuel	Compos	ition (wt%)		Additive	ive	Water	Aluminu	Aluminum Corrosion Test	on Test	Stability	of Fuel*1
	НС		V			,	Loading/Fuel	Ĕ	Evaluation	Evaluation	Weight Loss	Roam	_
lation	Naphtha	Ethanol	NPA	I PA NB	귕		(WC%)	(WL%)	1emp (℃)	Time (hr)	Rate (%)	22	-10° C
EIB75	25.0	35.0			40.0	None			8 8	24	100	100	100
		34.9			40.0	None		0.1	3 8	42.6	<u> </u>	9 5	3 5
		o4. 9			.ec -	2			G G	£7	>	001	201
	25.0	35.0			40.0	None		0.0	120	24	100	100	100
	24.8	34.7			39.6	None		1.0	120	24	100	100	001
	7.47.	34. 0			39. 5	None			120	1 77	- -	100	001
EIB75-Me	24.6	34.5			39.4	Methanol	1.5	0.0	100	24	0	100	100
	24.6				39. 4		1.0		100	24	0	100	100
	24.5				39.2			0.0	120	24	0	100	100
	24.5	34.3					1.5	0.5	120	24	0	100	100
	24. 5				39.2			1.0	120	24	0	100	100
F I B 75-F(24	34.0			38.8	Ethylene		0.0	100	24	0	100	100
	24.5	34.3			39.2	glycol	1.5	0.4	100	24	0	100	100
	6				0				001	70	_	100	100
	23.8	33.3			38.0				921	\$ 7 c	- -	2 2	3 5
	24. 6	55. 0 - 72			30.		9 0		22.0	57 77	> <	001	200
	;	:							<u> </u>	i	,		
EIB75-MEK	24.3				38.8	Methyl ethyl	3.0	0.0	100	24	0	100	100
	24.9	34.8			39.8	ketone			100	24	0	100	100
	ć	6		•	0				001	Č	c	9	100
	27.0	23.0			90.00				130	47 77	> 0	81	8 5
	24.0	24. ¢			39.1		, c	, - , -	200	24	> C	100	100
) i		•						5	- -	221	2
E I B 75-GM	24.0	33.6			38.4	Methyl	4.0	0.0	100	24	0	100	100
	24.4	34.2		<u></u>	39. 1	formate			100	24	0	100	100
	0 66	900			36		α		190	24	c	100	100
	23.0	20.7			, 0 , 0		0.5		120	27	- c	2 2	201
	24.4	34.1			39.0		2.0	0.5	120	24	0	100	100
EIB75-AA	24.8	34.7			39.7	Acetaldehyde	8.0	0.0	100	24	0	100	100
	24.9	34.8							901	24	0	100	100
	24.8	34.7			39. 6		1.0		120	24	0	100	100
	24.8	34.8			39, 7				120	24	0	100	100
	24.8	34.8			39. 7		0.2	0.5	120	24	0	100	100
]
								*	*1 100 →Perfectly phase-solved,	fectly phas		0 →Layer-separated	parated

Designation		Fuel	Composition		(wt%)		Additive	ive	Water	Alumin	Aluminum Corrosion Test	ion Test	Stability of Fuel*1	of Fuel*1
of	HC		A G	Alcohol	4 0 12		Kind	Loading/Fuel	Loading/Fuel	Evaluation	Evaluation Evaluation		Room Temp.	Low Temp.
Formulation	Naphtha	Naphtha Ethanol	NPA	A L	A B S	Y R	Ī	(WLW)	(WLW)			Kate	3 6	201
PNB30	0.07			0.0	0 0	0.01	None	_	o -	2 2	120	ĥ c	001	001
	6.6			2	?	<u> </u>	None	_	;	3	2	>	2	3
	70.0			10.0	10.0	10.0	None	_		120	24	100	100	100
	68.7			8.6	8.6	8.6	None		1.8	120	24	0	100	0
	9.89	_		8.6	8.6	8.6	None			120	24	0	0	0
PNB30-Me	69.3						Methanol	1.0		100	24	0	100	100
	69.5			9.6	9.9	9.9		0.4	0.3	100	24	0	100	100
	9							L.		001	70	-	001	0
	0.60							F. 5		021	1 7	o c	001	001
	69.2							- - - -		021	24	>	001	8 6
	68.4			n 0	e 0	9. O		. o	ი თ თ	071	54 24	0 0	001	8 6
	67.2	_						2.0		120	24	0	100	0
PNB30-EG	68.6						Fthylene			100	24	0	100	100
	69.2			9.6	6.6	6.6	glycol	1.0	0.2	100	24	0	100	100
	89									120	24	C	100	100
	88.8			ာတ	တ်	8		: 2 :	0.5	120	24	. 0	100	100
	69. 1									120	24	0	100	100
PNB30-Ac	66.69		T				Acetone			100	24	0	100	100
	6.69			10.0	10.0	10.0		0.1	0.1	100	24	0	100	100
	9										č	•	001	-
	90.00 00.00			0.0	0 0	0.0		0.7	o 1	120	24	0	100	8 00
	67.3			9.0	9.6	9.6		2.0	8.1.8	120	24	00	100	100
	66.5									071	6.7	0	100	0
PNB30-GM	69.0			6.6	9.6	9.9	Methyi	1.5	0.0	100	24	0	100	100
	69. 2						formate			001	5.4	0	001	001
	68.3									120	24	0	100	100
	68.8									120	24	0	100	100
	69.4			9.6	9.9	9.6		9.0	0.3	120	24	0	100	100
	9.99									120	24	0	100	100
	65.5									120	24	0	001	0
PNB30-BA	69.7			10.0	10.0	10.0	Acetaldehyde	0.4	0.0	100	24	0	100	100
	8.69			10.0	10.0					001	24	0	001	100
	69.7			10.0	10.0	10.0		0.5	0.0	120	24	0 (001	100
	69. 7									120	24	0	100	100
				-						*1 100 →P	erfectly ph	*1 100 -Perfectly phase-solved, 0	→Layer-separated	separated

Designation		Fuel	Composition		(wt%)		Additive	ive	Water	Aluminu	Aluminum Corrosion Test	on Test	Stability	of Fuel*1
of	НС	ıı	¥	A coho l			Kind	ding/Fuel	Loading/Fue!	Ē	valuation	Weight Loss		Low Temp.
Formulation	Naphtha	Ethanol	NPA				1	(wt%)	(wt%)	Temp. (°C)	ime (hr)	Rate (%)	25° C	-10° C
PNB15	85.0 84.9			5.0	0 0	0 0 0	None None		0.0	80	120	1 0	001	100
	0						No.			130	76	001	001	001
	84.6			0 0	9.0		None	-	0.5	120	24	0	001	<u> </u>
	84. 4						None			120	24	0	0	0
PNB15-Me	84.3			5.0	5.0	5.0	Methanol	8.0	0.0	100	24	0	100	100
	84.5									100	24	0	100	100
	83.7									120	24	0	100	100
	84.0									120	24	0	100	100
	84.3			5.0	2.0	9.0		0.0		120	24	00	001	100
	81.9				4. 4. v &	4. 4. 8. 8		, e, 0		120	24	00	100	30
PNB15-PG	82.5			4.9	4.9	4.9	Propy lene	3.0	0.0	100	24	0 (100	100
	83. 6						glycol			100	24	0	100	001
	81.6							4.0		120	24	0	100	001
	83.1 83.9			4.9	4.9	4, 4, 0 0		2.0 1.0	0.2	120 120	24 24	00	00 00 00 01	<u> </u>
						Ι,								
PNB15-MPK	84.7			9:0	2:0		Methyl-n-propyl ketone	0.0 2.2	0.0 0.1	00 00 1	24 24	00	001	801
	84.6			5.0	5.0	5.0		0.5	0.0	120	24	0	100	100
	84.7									120	24	0	100	100
	81.2			4.8	4.8	4.8		4.0 5.0	0.5	120 120	24 24	00	100	000
PNB15-SM	83.7			6.4	6.4	6 4 9	Methyl acetate	1.5	0.0	100	24	0 0	100	100
										9			-	-
	79.9 82.3			4. 4. ~ 8	4.8	4, 4, ~ 8		၁၀	0.0 0.2	120 120	24 24	- 0	8 8	8 8
	83.9									120	24	00	001	001
	78.5									120	24	0	001	0
PNB15-AA	84.7			5.0	5.0	5.0	Acetaldehyde	0.3	0.0	100	24 24	0 0	100	100
	84. 6 84. 7			5.0	5.0	5.0		0.5	0.0	120 120	24 24	00	100	100
										*1 100 →P.	*1 100 -Perfectly phase-solved.	ase-solved, 0	Layer-separated	eparated

т.	_	_																				1	
Stability of Fuel*1	_	-10° C	8 8	100	100	00	100	100	001	100	<u>0</u>	001	100	8 8 8	100	100	100	100	100	100	<u>0</u> 0	100	100
Stability	Room Temp.	25° C	9 0	100	100	0 0	100	100	100	100	0 0 1	100	100	100	001	100	100	001	100	100	100	100	100
ion Test	Weigh	뽧	100 85	30	100		0 0	0	0	0	00	0 0	00	0	0 0	00	00	0	0 0	00	00	0	0
Aluminum Corrosion Test	Evaluation	Time (hr)	120	120	24	24 24	24 24	24	24	24	24 24	24 24	24	24	24 24	24 24	24 24	24 24	24	24	24 24	24 24	24 24
	Evaluation Evaluation	Temp . (°C)	0808	8 8	120	120	100	120	120	120	120	100	120	120	100	120	120 120	100	120	120	120 120	100	120 120
Water	Loading/Fue!	(wt%)	0 -	0.2	0.0	10. 0 10. 5	0.0		0 0	0.4	10. 0 10. 5	0.0		. O.	0.0	0.0	10.0 10.5	0.0	0.0	0.0 4.0	10.0 10.5	0.0	0.0
	Loading/Fuel	(wt%)					1.0 0.4				3.0 0.0	4.0	6.0	5 6 6	0.3	0.5	3.0	4.0	0.0		5.0	0.3	0.5
Additive	Kind		None	None	None	None None	Methanol					Ethylene glycol			Methyl etyhl ketone			Ethyl formate				Propionaldehyde	
		IBA	25.0	25.0	25.0	22. 5	24.8	24.5	24.6	24.7	22. 0 21. 6	24. 0 24. 4	23.5	24. 2 24. 4	24.9 24.9	24.9 24.9	21.8 21.4	24. 0 24. 5	23.5	24. <i>2</i> 24. 7	21. 5 21. 1	24.9 24.9	24.9
(wt%)		NBA	25.0	24.9	25.0	22. 5 22. 4	24.8 24.8	24.5	24.6	24.7	22.0	24. 0 24. 4	23.5	24. 4 24. 4	24.9 24.9	24.9	21.8	24.0 24.5	23.5	24. 2	21.5	24.9 24.9	24.9 24.9
Composition	A coho	IPA	25.0	24.9	25.0	22. 5	24.8	24.5	24.6	24.7	22. 0 21. 6	24. 0 24. 4	23.5	24. 4	24.9 24.9	24. 9 24. 9	21.8	24. 0 24. 5	23.5	24. 2	21. 5 21. 1	24.9 24.9	24. 9 24. 9
Š		NPA																					
尚		=																					
Fuel Co		Ethano										1											
Fuel	НС	Naphtha Ethano	25.0	25.0	25.0	22. 5 22. 4	24.8	24.5	24.6	24.7	22. 0 21. 6	24. 0 24. 4	23.5	24. 2	24.9 24.9	24. 9 24. 9	21.8	24. 0 24. 5	23.5	24. 2	21.5	24.9 24.9	24.9 24.9

Designation		Fue	S	position ((wt%)		Additive	ive	Water	Aluminu	Aluminum Corrosion	ion Test	Stability	of Fuel*1
of		ır		1 1			Kind	Loading/Fuel	Loading/Fuel		Evaluation Evaluation	Weight Loss	Room Temp.	Low Temp.
Formulation	æ	w	NPA	⋖	NBA			(wt%)	(wt%)		Time (hr)	Rate (%)	25° C	-10° C
EIPP30	70.0 69.9	10.0		10.0		10. 0 10. 0	None		0.0	08 8	120	51 0	100	000
	70.0	10.0		10.0		10.0	None			120	24	100	100	100
	68.3 67.9	9.8		9.8	-	9.8 7.	None None		3.0	120 120	24 24	00	0 0	00
EIPP30-Me	69.0	6.6		6.0		6.6	Methanol	1.5	0.0	100	24	0 0	100	100
	F .60				· · · ·					3	5 3	> <	3	
	68.3 68.6	0 0 0 0		တ တ တ တ		တ ထ တံ တံ		2.5 1.5	0.0 9.0	120	24	00	301	00 00
	69.0									120	24	0	100	100
EIPP30-EG	68. 6 69. 0	9.8		9.6		9.6 9.9	Ethylene glycol	2.0	0.0 0.4	100 100	24 24	0 0	100	100
	66.5									120	24	0 0	100	100
	67.5 67.9	9.6		9 .6 .7		9.6		3.0 2.0	0.6 1.0	120	24	00	100	801
EIPP30-Ac	67.9 69.7	9.7		9.7		9.7	Acetone	3.0	0.0	100	24	0 0	001	001
	67.2	9.6	•	9.6		9.6				120	24	0	100	100
	69. 2		• •							120 120	24 24	00	8 8	00 O
	64. 1 63. 0	9.2		9.2		9.2		6.0	3.0	120 120	24 24	00	100	0 0
EIPP30-GM	69. 0 69. 2	9.6		9.9		9.9	Methy! formate	1.5	0.0	100	24 24	00	100	100
	65.8	9.4								120	24	00	100	001
	69.2	9.6		6.6	<u> </u>			0.5	; -i ;	120	24	000	100	000
	63. 4 62. 3	. 8 . 9								120	24	> •	100	0
EIPP30-BA	69. 6 69. 7	9.9		9.9		9.9	Butylaldehyde	0.6	0.0	100	24 24	00	100	100
	69.3 69.5	9.6		6.6		6.6		1.0 0.2	0.0	120 120	24	00	100	100
									*	:1 100 →Per	rfectly pha	*1 100 →Perfectly phase-solved, 0 →Layer-separated	→Layer-se	parated

*1 100 →Perfectly phase-solved, 0 →Layer-separated

Designation		Fuel	Composi	position (v	(wt%)		Additive	ive	Water	Aluminu	Aluminum Corrosion Test	on Test	Stability	of Fuel*1
of	ЭН		Αľ	l ł			K	ding/Fuel	Loading/Fuel	屲	Evaluation	Weight Loss	Temp	Low Temp.
Formulation	œ	Ethanol	NPA	Ϋ́	NBA			(wt%)	(wt%)	Temp. (°C)	Time (hr)	Rate (%)	25° C	-10° C
EIPP15	85.0 84.9	5.0 5.0		2.0		5.0 5.0	None None		0.0	08	120	16 0	100	001
	85.0						None			120	24	100	001	100
	84.3	0 0 0 i		0 0			None		8 0.1	120	24	00	000	00
							200							
EIPP15-Me	84. 2 84. 2	5.0		5.0		5.0	Methanol	1.0 0.5	0.0	001	24	00	001	100
	83.3					6.9				120	24	0	001	100
	83.8	4.9		4.9		4.9		1.0	0.4	120	24	0 0	100	100
	84. 1									021	1 77	>	901	100
EIPP15-PG	82.9	4.9		4.9	-	4.9	Propylene	2.5	0.0	100	24	0 0	001	100
							g i yco i			001	74	>	001	001
	81.6					4.8				120	24	0	100	100
	83.0	4.9		6.4		4.9		2.0	0. o	120	24 24	0 0	100	100
	o									21	1	>	2	221
EIPP15-DEK	83. 3 84. 6	4.9 5.0		5.0		4.9 5.0	Diethyl ketone	2.0 0.2	0.0	100	24 24	0	100	001
	82.5	4.9								120	24	0 0	001	100
	84. 2 4. 4	ы 0 0								120	24	00	001	3 8
	80.9	4.8		4.8		4.8		4.0 5.0	0.8 1.0	120 120	24	00	100	0 0
EIPP15-SM	84.0 84.2	4.9 5.0		5.0		4.9 5.0	Methyl acetate	1.2	0.0	100	24	00	100	100
	81.6		-						0.0	120	24	0 (100	100
	83.8									120	24 24	0 0	3 8	3 6
	80.1	4.7		4.7		4.7		5.0	0.8	120 120	24 24	00	100	000
EIPP15-PA	84. 6 84. 6	5.0		5.0	<u> </u>	5.0	Propinaldehyde	0.5	0.0	100	24 24	0 0	100	100
	84.3 84.5	5.0		5.0				0.8	0.0	120	24 24	00	100	100
			1		1									1

Designation		Fue	Composition	ion (wt%)		Additive	ive	Water	Aluminu	Aluminum Corrosion Test	on Test	Stability of Fuel*1	of Fuel*1
of	НС		⋖			Kind	ding/Fuel	Ľ	Evaluation	Evaluation	Evaluation Evaluation Weight Loss		Low Temp.
Formulation		Ethanol	NPAII	I PA NBA			(WE%)	(MC%)	<u></u>	lime (nr.)	Kate (%)	25.52) - -
EIPP75	25.0	25.0	- 25	25.0	25.0	None		0.0	& :	120	100	100	00 5
	25.0	24.9		0	25.0	None		0.1	& :	120	55	100	00 ;
	25.0	24.9	- 24	6.3	25.0	None		0.5	<u>@</u>	120	0	100	100
	25.0	25.0	25		25.0	None			120	24	100	100	100
	24.6	24.6	24	24.6	24.6	None		1.5	120	24	100	100	100
	24.6	24.6	24.	9 '	24.6	None			120	24	0	100	100
FTPP75-Me			24	.5	24.5	Methanol	2.0		100	24	0	100	100
	24.6	24.6	24.		24.6		1.0	0.5	100	24	0	100	100
	· ·				0 70		c		1.90	76	<u> </u>	001	8
	24.3	24.3	24	24. 3	24. 5 24. 4		2.0	0.0	120	24	-	001	3 8
	24.6	24.6	24.	9 ::	24.6		0.6		120	24	0	100	100
EIPP75-EG	24.0	24.0	24	0	24.0	Ethylene			100	24	0	100	100
	24.4	24.4	24	24. 4	24.4	glycol	2.0	0.5	100	24	0	100	100
	23.0	23.0		.0	23.0		8.0		120	24	0	100	100
	23.6	23.6	23.	9.	23.6		5.0	0.5	120	24	0	100	100
	24.0	24.0	24.	0 :	24.0		3.0		120	24	0	100	100
FIPP75-MFK			24	.3	24.3	Methy ethy!		0.0	100	24	0	100	100
	24.9	24.9	24.		24.9	ketone	0.2	0.3	100	24	0	100	100
	23.8	23.8	23	- 8.	23.8		5.0		120	24	0	100	100
	24.7	24.7	24	24.7	24.7		1.0	0.2	120	24	0	100	100
	24.8	24.8	24.	8:	24.8		0.2		120	24	0	100	100
EIPP75-GM		24.3	24	8.3	24.3	Methyl			100	24	0	100	100
	24.4	24.4	24.		24.4	formate	2.0	0.4	100	24	0	100	100
	22.8	22.8	22		22.8				120	24	0	100	100
	24.4	24.4	24.		24.4		2.0	0.5	120	24	0	100	100
	24.6	24.6	24.	9.1	24.6				120	24	0	100	100
EIPP75-AA			24		24.9	Acetaldehyde			100	24	0	100	100
	24.9	24.9	24.	6.1	24.9		0.2	0.2	100	24	0	100	100
	24.8		24	- 8	24.8		1.0	0.0	120	24	0	100	100
	24.8	24.8	24.	8:4	24.8		0.2		120	24	0	100	100
								*	վ 100 →Per	*1 100 →Perfectly phase-solved,	0	→Layer-separated	parated

100 →Perfectly phase-solved, 0 →Layer-separated

Stability of Fuel*I Room Temp. Low Temp. 25° C -10° C 9 2 100 100 100 901 800 001 100 88880 88880 88 88880 901 22222 880 8 100 8 88 20000 001 001 22222 88 Aluminum Corrosion Test
Evaluation Evaluation Weight Loss
Temp. (%) Time (hr) Rate (%) 6800 0 00000 00 00000 00 00000 120 120 22.22 24 88 120 120 120 100 120 100 120 900 120 120 120 120 120 88 120 120 120 120 120 800 120 120 120 120 120 Water Loading/Fuel (wt%) 0.0 0.1 0.0 0.0 0.0 0.0 0.1 0.2 0.5 0.5 0 - 2 4 5 0.0 0.1 0.2 0.4 0.5 0 4 5 0.0 00000 000 00 00 00 Loading/Fuel (wt%) 00000 4.0 3.0 1.0 6.0 1.5 00200 S S ည 00 2.1.0.4.3 0 ö l o o. હ્યું ∹ 4.40000 ري ان Additive Propionald ehyde Propylene glycol Ethyl formate Methanol Diethyl ketone Kind None None None None None В (wt%) cohol ΡA Composition 9.6 9.8 10.0 9.5 000 9 7 6 4 8 10. 0.000 10. 10. 10. 10. ത്ത് <u>ი</u> ი 6, 6, 0.0.0.0.0. Fuel Ether MTBE 00 000 0 ထ တ 8 6 0 7 7 **ი** ი 8 8 6 6 9 **ი** ი 00087 છે. ည်းသ ည် ĸ. છ છ 4. 4. 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 HC Naphtha 0 6 9 4 0 9 9 0 2 9 0 9 2 2 9 4 9 G 21 85. 84. 84. 84 83. 84. 83. 84. 84. 80. 85. 84. 84. 84. 82. 83. 81. 83. 84. 80. 82. 83. 81. 82. 84. 79. 78. Designation of Formulation E10-E-PG E10-E-DEK E10-E-Me E10-E-GE E10-E-PA E10-E

Fig. 19

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Low Temp. -10° C Stability of Fuel* 100 001 88 800 8 100 88 88880 88 88880 100 22220 100 →Perfectly phase-solved, 0 →Layer-separated Room Temp. 1 25°C 880 100 100 100 901 800 88888 001 88888 88 22222 Aluminum Corrosion Test Evaluation Evaluation Weight Loss Temp.(°C) Time (hr) Rate (%) 800 ж O 00000 00000 00000 828 2422 24 24 24 24 24 24 22222 22 22 22222 24 24 22222 9 9 9 2021 200 120 100 20 900 120 120 120 120 120 120 88 99 Water Loading/Fuel (wt%) 0.0 0.0 0.0 0.0 0.0 0.1 0.2 1.5 1.7 0.0 0.1 0.2 1.5 0.0 0.1 0.2 1.5 1.7 0 0 00 Loading/Fuel (wt%) 0000 00200 ၁ ၁ 00 00000 Ω S 00 ö ö ö ö . ⊶ 4.50.05.7. છે સ 5 -: 24.30.4. 8 4 2 9 8 Butylald ehyde Ethylene glycol Methanol Methy! formate Acetone None None None None M NB, (wt%) cohol PA Composition 3 4 20 66 23 7 9 9 1 0 - 0 8,8 20. 19. 19. 19. 65 9. 19. 19. 18. 19. 81.9. 19. 19. 18. 18. 18. 19. 19. 91 19 19 19 18 Ether MTBE ဝ္စေထ 980.41 **~** ∞ 2 9 8 8 0 ထ တ 8 6 6 9 10. 0.69 10. 10. 10. 10. 9.9.0.9.9 ങ്ങ് တ်တ် 0,0,0,0,0 တ်တ် 0,0,0,0,0 HC Naphtha 008 9575 4 - 6 8 2 0 0 2 2 3 . 69 69. 69. 69 67. 68. 69. 65. 65. 67. 70. 69. 69 67. 68. 64. 67. 64. 63. 69 69 68. 69. 66. 66. Designation of Formulation E20-E-Me E20-E-Ac E20-E-GM E20-E-BA E20-E

Fig. 20

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Fig. 21		l _g	Fuel Comp	Composition (wt%)		Additive	tive	Water	Aluminu	Aluminum Corrosion Test	on Test	Stability of Fuel*1	of Fuel*1
0 f	오:	Ether		Alcohol		Kind	Loading/Fuel	<u>آگ</u> ا	Evaluation	Evaluation	Evaluation Evaluation Weight Loss	Temp.	_
Formulation	Naphtha	EIBE		NPA I PA	NBA I BA		(WLW)	(ML%)	豆	ime (nr)	Kate (%)	25 5	o 01-
E50-E	20.0 20.0	30.0	50.0 49.9			None		0.0 0.1	100	120 120	8 0	8 8	<u>8</u> 8
	20.0	30.0	50.0			None		0.0	120	24	100	001	100
	17. 4	26. 3 26. 1	43.8 43.5			None		12. 5 13. 0	120	24	00	30	0
Е50-Е-Ме	19.8	29.8	49.6			Methanol	0.8	0.0	100	24	0	100	100
	19.8	29.7	49.5				1.0	0.0	120	24	0	100	100
E50-E-EG	19.9	29.8	49.7			Ethy lene	0.7	0.0	100	24	0	100	100
	19.8	29. 7	49. 5				1.0	0.0	120	24	0	100	100
E50-E-MEK	19. 2 19. 6	28. 8 29. 4	48. 0 49. 0			Methyl ethyl ketone	4.0	0.0	100	24 24	0	100	100
	18.8	28.2	47.0				6.0	0.0	120	24	00	00 1	100
	19. b	29.4	49. 0				0.4	0.0	120	24	00	3 00	8 8
	16.5	24.8	41.3				5.0	12. 5 13. 0	120 120	24	00	0 0 0 0 0	<u>0</u> 0
	;	;) :				·			i			,
E50-E-GE	18.8 19.4	28. 2 29. 1	47.0 48.5			Ethyl formate	6.0 3.0	0.0	100	24 24	0	100	100
	18.0	27.0	45.0				10.0	0.0	120	24	00	001	100
	19.0	28.5 29.3	47.5				2.0	0.7	120	24 24	00	3 8	100
	16.7	25. 1 24. 3	41.8				4.0	12.5	120	24 24	00	00 100	0 0
		;) ;										
E50-E-AA	19.4	29. 1	48.5			Acetaldehyde	3.0	0.0	100	24 24	0 0	100	100
	13.	c .67	49. 7		•		. ·	.,	201	F 7	>	2	2
	19.2	28.8	48.0				4.0	0.0	120	24	0 (100	100
	19.6	29.4	49.0				2.0	0.1	120	24.24	00	100	001
	17.1	25.7	42.8				2.0	12.5	120	24	0	100	100
	16.8	25.2	42.0				3.0	13.0	120	24	0	100	0
								*	100 →Perfe	etly phase	*1 100 →Perfectly phase-solved, 0 →Layer-separated	_ayer~sepa	rated

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Designation		교	Fuel Com	Composition	n (wt%)		Γ	Additive	tive	Water	Aluminum	um Corrosion	ion Test	Stability	of Fuel*1
of	오:	Ether			oho			Kind	Loading/Fuel	Γος	Evaluation	u	Weight Loss	Room	Low Temp.
Formulation	Naphtha	MTBE	Ethanol	NPA	۵,	NBA	I B A	2	(WE%)		Temp. (°C)	٤	Rate (%)	7	-10° c
IN40-E	30.0	30.0 30.0			20.0 19.9	% % % % %		None		0.0	06 06	24	0 0	100	001
	30.0	30.0		-				None			120	24	100	100	100
	28. 4 28. 3	28.4			18.9	18. 9 18. 8		None None		ည် သို့ ည	120 120	24 24	00	0 0	00
IN40-E-Me	29.8 29.8	29.8 29.8			19.8 19.9	19.8 19.9		Methanol	0.8	0.0	001 100	24 24	0	100	100
	29.5	29. 5			19.7				1.7		120	24	0	100	100
	29.6	29. 6				8 61				0.2	120	24	0 0	8 8	001
	28. 1 27. 7	28.1			18.7	18.7			2.0	യ വ വവ	120	24 24	000	1000	000
IN40-E-E G	29. 6 29. 6	29. 6 29. 6			19.7	19. 7		Ethylene glycol	1.5	0.0	100	24 24	0 0	100	100
	29. 1	29. 1									120	24	0 (001	001
	29.3 29.6	29. 3 29. 6			19. 6	19. 6			1.0	0.0 2.4	120	24	00	001	001
IN40-E-Ac	29.9 29.9	29. 9 29. 9			20. 0 20. 0	20. 0 20. 0		Acetone	0.2	0.0 0.1	001 001	24 24	0 0	100	100
	29.9 29.9	29.9			20.0	20. 0 20. 0			0.2	0.0	120	24	00	100	100
	27.8	27.8			18.5	18.5			3.0	യ വ വ വ	120 120	24 24	0	100	100
IN40-E-GM	29. 6 29. 7	29. 6 29. 7			19. 7 19. 8	19. 7 19. 8		Methyl formate	1.5 0.8	0.0 0.1	100	24 24	0	100	100
	29. 1	29. 1 29. 6		-	19.4				3.0	000	120	24	000	100	001
	27.8 27.4	27. 8 27. 4			18.5	18.5			3.00		120	24 24	000	001	000
IN40-E-BA	29.9 29.9	29. 9 29. 9			19. 9 19. 9	19. 9 19. 9		Butylaldehyde	0.3	0.0 0.1	100	24 24	0 0	100	100
	29.9 29.9 29.9	29. 9 29. 9 29. 9			19.9 19.9 19.9	19.9 19.9 19.9			0.5 0.2 0.1	0.0 0.1 0.2	120 120 120	24 24 4	000	100	1000
						1	1			*	1 100 →Pe	*1 100 →Perfectly phase-solved,	0	→Layer-separated	sparated

Fig. Part Fig. France N P A 1 P A	Designation	<u> </u>	1	el Composition (wt%	tion (wt	(%)		Addi	tive Logina (Eus)		ئال	Aluminum Corrosion Test		+	
19.0 5.0 10 5 Nume 0.0 90 24 19.0 5.0 10 5 Nume 0.0 90 24 19.0 5.0 10.0 5.0 Nume 0.5 0.0 120 24 19.1 5.0 10.0 5.0 Nume 0.5 0.0 120 24 19.2 5.0 10.0 5.0 Nume 0.5 0.0 120 24 19.3 4.9 9.9 4.9 6.0 0.5 0.0 120 24 19.4 5.0 9.9 4.9 6.0 0.5 0.0 120 24 19.4 5.0 9.9 4.9 6.0 0.5 0.0 120 24 19.5 4.9 9.9 4.9 8.0 4.9 8.0 0.0 120 24 19.5 4.9 9.9 4.9 8.0 4.9 8.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 0.0 120 24 19.5 5.0 10.0 5.0 Nume 0.0 120 120 19.5 5.0 10.0 5.0 Nume 0.	of mulation	HC Naphtha	Ether MTBE	I N P	A A	NBA		Kind	Loading/Fuel (wt%)	Loading/Fuel (wt%)		Evaluation Time (hr)	Welg Rate	Room Temp. 25°C	Low Temp. -10°C
80.0 5.0 None None 0.0 120 24 79.5 5.0 None 0.0 120 24 79.6 5.0 None 0.0 120 24 79.6 5.0 None 0.0 120 24 79.6 5.0 10.0 5.0 None 0.0 120 24 79.6 5.0 10.0 5.0 Methanol 0.5 0.0 120 24 79.1 4.9 4.9 4.9 0.0 0.0 0.0 24 79.6 4.9 4.9 4.9 1.0 0.0 0.0 24 79.8 4.9 4.9 4.0 0.0 0.0 0.0 24 79.8 5.0 4.9 4.9 4.0 0.0 0.0 0.0 24 79.8 5.0 4.9 4.9 4.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	ш	80.0 79.9	5.0 5.0			2		None None		0.0	06 06	24 24	9	100	001 001
79.6 5.0 10.0 5.0 Methanol 0.5 0.0 100 24 79.6 5.0 10.0 5.0 10.0 5.0 10.0 24 79.2 5.0 9.9 5.0 10.0 5.0 10.0 24 79.4 5.0 9.9 5.0 9.9 4.9 1.0 2.0 10.0 24 79.6 4.9 9.9 4.9 1.0 0.5 0.0 10.0 24 79.0 4.9 9.9 4.9 1.0 0.0 1.0 2.0 1.0 2.4 1.0 0.0 1.0 2.4 1.0 2.4 1.0 0.0 1.0 0.0 2.4 1.0 0.0 2.4 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 2.4 1.0 0.0 1.0 0.0 2.4 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0 1.0 0.0		80.0 79.5 79.4						None None None			120 120 120	24 24 24	1000	100 0 0	100
78.8 4.9 4.9 5.0 4.9 5.0 0.8 0.2 120 24 79.4 4.9 9.9 5.0 6.0 0.5 0.6 120 24 779.1 4.9 9.9 5.0 6.0 0.8 0.2 120 24 779.1 4.9 9.9 5.0 6.0 0.0 0.0 120 24 779.2 4.9 9.9 4.9 Propylene 2.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.1 120 24 779.8 5.0 10.0 5.0 Ethyl formate 0.0 0.0 1120 24 779.8 5.0 10.0 5.0 Ethyl formate 0.0 0.0 1120 24 779.8 5.0 10.0 5.0 Ethyl formate 0.0 0.0 1120 24 779.8 5.0 10.0 5.0 Ethyl formate 0.0 0.0 1120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 0.0 120 24 779.8 5.0 10.0 5.0 0.0 0.0 0.0 120 24	3-Ме	79.6			10.0		22	ethano!			100	24	0 0	100	100
78.4 4.9 9.8 4.9 Propylene 2.0 0.0 100 24 79.0 4.9 4.9 glycol 1.0 0.2 100 24 78.2 4.9 4.9 4.9 1.0 0.0 120 24 78.2 4.9 4.9 4.9 2.0 0.0 120 24 78.2 4.9 4.9 4.9 2.0 0.2 120 24 79.8 5.0 10.0 5.0 isobutyl 0.2 0.1 100 24 79.6 5.0 10.0 5.0 isobutyl 0.2 0.1 100 24 79.1 4.9 4.9 6.0 0.0 120 24 79.8 5.0 10.0 5.0 Ethyl formate 1.0 0.0 120 24 79.4 4.9 5.0 Ethyl formate 1.0 0.0 120 24 79.4 4.9 5.0 </td <td></td> <td>78.8 79.2 79.4 79.1 78.6</td> <td></td> <td></td> <td></td> <td></td> <th></th> <th></th> <td></td> <td></td> <td>120 120 120 120 120</td> <td>2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4</td> <td>00000</td> <td>100 100 100 100</td> <td>001</td>		78.8 79.2 79.4 79.1 78.6									120 120 120 120 120	2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	100 100 100 100	001
76.8 4.8 9.6 4.8 4.0 0.0 120 24 78.2 4.9 9.8 4.9 4.9 1.0 0.2 120 24 78.9 4.9 4.9 4.9 1.0 0.0 1.0 24 79.8 5.0 10.0 5.0 isobutyl 0.2 0.1 100 24 79.1 4.9 9.9 4.9 4.9 0.2 0.1 120 24 79.4 4.9 9.9 4.9 0.5 0.0 120 24 79.4 5.0 0.0 0.0 0.0 1.0 24 79.4 5.0 0.0 0.0 0.0 1.0 24 79.4 5.0 0.0 0.0 0.0 1.0 24 78.5 4.9 5.0 Ethyl formate 0.0 0.0 1.0 24 78.4 5.0 9.9 4.9 5.0 Ethyl formate	8- P G	78. 4 79. 0					<u>-</u>	ropy lene glyco i			001	24	0 0	001	100
79.8 5.0 Methyl 0.3 0.0 100 24 79.8 5.0 10.0 5.0 isobutyl 0.2 0.1 100 24 79.6 5.0 10.0 5.0 6.5 0.0 120 24 79.8 5.0 10.0 5.0 6.5 0.0 120 24 79.1 4.9 4.9 4.9 0.5 0.6 120 24 79.2 5.0 9.9 4.9 6.0 0.1 100 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.0 120 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.0 120 24 76.0 4.8 9.5 4.8 5.0 0.0 120 24 76.3 4.8 9.5 4.8 5.0 0.0 120 24 75.4 4.7 9.4 4.7		76.8 78.2 78.9		•••							120 120 120	24 24 24	000	100	100
79.6 5.0 10.0 5.0 no.5 0.0 120 24 79.8 5.0 10.0 5.0 6.5 0.0 120 24 79.1 4.9 9.9 4.9 0.5 0.6 120 24 79.2 5.0 9.9 5.0 Ethyl formate 1.0 0.6 120 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.6 120 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.6 100 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.0 100 24 78.2 4.9 5.0 Ethyl formate 1.0 0.0 100 24 78.2 4.9 5.0 Ethyl formate 1.0 0.0 120 24 78.4 4.7 5.0 10.0 0.0 1.0 0.0 1.0 24 <	E-MBK	79.8			10.0		· <u>-</u>	Methy! sobuty!		0.0	100	24 24	0 0	100	100
79.1 4.9 9.9 4.9 6.5 0.5 0.6 120 24 78.6 4.9 9.8 4.9 5.0 Ethyl formate 1.0 0.6 120 24 79.4 5.0 9.9 5.0 Ethyl formate 1.0 0.0 100 24 76.0 4.8 5.0 0.0 120 24 78.2 4.9 5.0 0.0 120 24 78.3 4.8 4.9 2.0 0.0 120 24 76.3 4.8 4.9 1.0 0.4 120 24 75.4 4.7 4.7 5.0 0.0 120 24 79.8 5.0 10.0 5.0 Propion 0.2 0.0 100 24 79.8 5.0 10.0 5.0 Propion 0.1 0.0 120 24 79.8 5.0 10.0 5.0 0.0 1.0 24 24 79.8 5.0 10.0 5.0 0.1 0.1 1.0 <td></td> <td>79.6 79.8</td> <td></td> <td></td> <td>10.0</td> <td></td> <th></th> <th>מוסום מ</th> <td></td> <td></td> <td>120 120</td> <td>24 24</td> <td>0 0</td> <td>001</td> <td>100</td>		79.6 79.8			10.0			מוסום מ			120 120	24 24	0 0	001	100
79.2 5.0 9.9 5.0 Ethyl formate 1.0 0.0 100 24 79.4 5.0 4.8 5.0 6.0 0.1 100 24 76.0 4.8 4.9 5.0 0.0 120 24 78.2 4.9 4.9 1.0 0.4 120 24 76.3 4.8 4.9 4.0 0.6 120 24 76.3 4.8 4.9 4.0 0.0 120 24 76.3 4.8 4.9 5.0 0.0 120 24 75.4 4.7 9.4 4.7 5.0 0.8 120 24 79.8 5.0 10.0 5.0 aldehyde 0.1 100 24 79.8 5.0 10.0 5.0 0.4 0.0 120 24 79.8 5.0 10.0 5.0 0.1 10.0 24 79.8 5.0 10.0 5.0 0.1 0.2 0.1 100 24 79.8 <td< td=""><td></td><td>79. 1 78. 6</td><td></td><td></td><td></td><td></td><th></th><th></th><td></td><td></td><td>120</td><td>24</td><td>00</td><td>100</td><td>001</td></td<>		79. 1 78. 6									120	24	00	100	001
76.0 4.8 9.5 4.8 5.0 0.0 120 24 78.2 4.9 9.8 4.9 2.0 0.2 120 24 76.3 4.8 9.9 4.9 1.0 0.4 120 24 75.4 4.7 9.4 4.7 5.0 0.8 120 24 79.8 5.0 10.0 5.0 Propion 0.2 0.0 100 24 79.7 5.0 10.0 5.0 aldehyde 0.1 100 24 79.8 5.0 10.0 5.0 0.1 100 24 79.8 5.0 10.0 5.0 0.1 100 24 79.8 5.0 10.0 5.0 0.1 120 24 79.8 5.0 10.0 5.0 0.1 120 24 79.8 5.0 10.0 5.0 0.1 120 24 79.8 5.0 10.0 5.0 0.1 0.2 0.1 120 79.8 5.0 10.0 5.0 0.1 0.1 120 24 79.8 5.0 10.0 5.0 0.1 120 24 <	3-6 E	79.2					£	yl formate			100	24	0 0	100	100
79.8 5.0 10.0 5.0 Propion 0.2 0.0 100 24 79.8 5.0 10.0 5.0 aldehyde 0.1 0.1 100 24 79.7 5.0 10.0 5.0 0.4 0.0 120 24 79.8 5.0 10.0 5.0 0.1 120 24 79.8 5.0 10.0 5.0 0.1 0.2 120 24		76.0 78.2 78.9 76.3									120 120 120 120 120	2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	100 100 100 100	001 001 001 001 0
5.0 10.0 5.0 0.4 0.0 120 24 5.0 10.0 5.0 0.2 0.1 120 24 5.0 10.0 5.0 0.1 0.2 120 24 5.0 10.0 5.0 0.1 0.2 120 24	3- P A	79.8			10.0		- 6	Propion Idehyde			100	24 24	0 0	100	001
		79.7 79.8 79.8			10.0 10.0 10.0						120 120 120	24 24 24	000	1000	100

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100 →Perfectly phase-solved, 0 →Layer-separated

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Low Temp. Stability of Fuel*1 Room Temp. 1 888 888 88 888 88 888 001 88 88 800 88 888 Weight Loss Rate (%) Aluminum Corrosion Test 0 001 001 880 00 00 000 00 000 00 000 Evaluation Evaluation Temp. (°C) Time (hr) 24 2222 88 22 22 23 001 120 120 120 8 8 22 22 88 2222 001 120 120 120 888 Loading/Fuel (wt%) Water 0 9 8 3 0 0 8 9 0 -370 2 1 0 000 000 o o 000 000 o o 000 o o 000 000 Loading/Fuel (wt%) 1.0 0.5 2.0 4.0 2.0 0.2 2.0 3.5 1.5 0.8 200 2 r 0 9 8 8 % ∺ ----00 00 000 Additive Methyl-n-propyl ketone Ethyl formate Acetaldehyde Ethylene glycol Methanol Kind None None None None None None I B 0 % ~ 9 2 9 2 2 4 0 2 9 မှ က မ $\infty \infty \infty$ NB 39. 39. 39. 39. 39. 39. 39. 39. 86. 66. 37. 38. 39. 39. 39. 39. 38. 39. 39. 39. 39. Fuel Composition (wt%) 9 A <u>Д</u> 35. 34. 34.35. 34. £ £ £ 33. 33.33.34. 34. 34. 34. 34.33. 34. 44. N P. Ethanol Ether DBE 5. 0 5. 0 5. 0 000 ວ່າ ວ່າ છ છે 4 4 6 4. 4. 4 4 4 છ છ 5. 5. 수 수 4 4 4 છ છે છે. છે. HC Naphtha 0 00 9 00 000 ∞ ∞ 9 ~ 8 21 12 ∞ n o 00 **თ** თ σ ∞ ~ ∞ 20. 20. 25. 19. 19. 19. 19. 19. <u>6</u> 91 91 90 91 19. 19. 19. 18. 19. 8 8 20.2 19. Formulation Des i gnat i on N75-E-A A N75-E-MPK .N75-E-GE [N75-E-Me IN75-E-E ₽ IN75-E

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Fig. 25 Designation		Fu	Fuel Compos	Composition (wt%)		F	Additive		Water		Aluminum Corrosion Test	ion Test	Stability of Fuel*	of Fuel*1
of Formulation	HC Naphtha	Ether MTBE		oho:	NBA	I BA	Kind	Loading/Fuel (wt%)	Loading/Fuel (wt%)		Evaluation Evaluation Temp. (°C) Time (hr)	Weight Loss Rate (%)	Room Temp 25°C	Low Temp. -10°C
E1B40-E	30. 0 30. 0	30.0 29.9	20.0 20.0			20. 0 20. 0	None None		0.0	06 06	24 24	100 0	100	100
	30.0 27.9 27.8	30.0 27.9 27.8	20.0 18.6 18.6			20.0 18.6 18.6	None None None		0.0 6.9 7.2	120 120 120	24 24 24	100 0	100 100 0	0000
EIB40-E-Me	29. 6 29. 6	29. 6 29. 6	19.7			19.7	Methanol	1.5	0.0	100	24	0	100	100
	29. 4 29. 6 29. 6	29. 4 29. 6 29. 6	19.6 19.7 19.7			19. 6 19. 7 19. 7		2.0 0.5	0.0	120 120 120	24 24 24	000	100	100
EIB40-E-E G	29. 7 29. 7	29. 7 29. 7	19.8 19.8			19.8 19.8	Ethylene glycol	1. 0 0. 7	0.0	100	24 24	0	100	001
	29. 4 29. 5 29. 6	29. 4 29. 5 29. 6	19.6 19.6 19.7			19. 6 19. 6 19. 7		2.0 1.5	0.0	120 120 120	24 24 24	000	100	100
EIB40-E-Ac	29.9 29.9	29.9 29.9	20.0 20.0		2 2	20.0 20.0	Acetone	0.2	0.0	100	24 24	0 0	100	100
	29. 1 29. 6 29. 8 27. 0 26. 6	29. 1 29. 6 29. 8 27. 0 26. 6	19.4 19.8 19.9 18.0			19.4 19.8 19.9 17.8		3.0 0.2 0.4 0.4	0.00 0.00 7.00 2.00 2.00 2.00 2.00 2.00	120 120 120 120 120	2 2 2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	1000	001 100 100 0
EIB40-E-GM	29. 3 29. 5	29.3 29.5	19.5			19.5 M	Methyl formate	2.5	0.0	100	24 24	0	100	001
	28. 5 29. 3 27. 3 26. 9	28. 5 29. 3 27. 3 26. 9	19.0 19.6 19.7 18.2 18.0			19. 0 19. 6 19. 7 18. 2 18. 0		3 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0.000 000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.	120 120 120 120 120	2 2 4 4 5 5 4 5 5 4 5 5 5 5 5 5 5 5 5 5	0000	100 100 100 100	100 100 100 100 0
E1B40-E-BA	29.8 29.8	29.8 29.8	19.9 19.9			19.9 B	Butylaldehyde	0.6	0.0	100	24 24	0	100	100
·	29. 7 29. 8 29. 7 27. 6 27. 2	29.7 29.8 29.7 27.6 27.2	19. 8 19. 9 19. 8 18. 4			19.8 19.9 19.8 18.4		1. 0 0. 2 0. 1 2. 0	0.0 1.0 7.2 2.3	120 120 120 120 120	2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	100 100 100 100 100	100 100 100 0
					1				*	*1 100 →Perfectly phase-solved,	ctly phase	0	→Layer-separated	rated

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Designation		P	Fuel Comp	mposition (wt%)	n (wt%)			Additive	tive	Water	Alumin	Aluminum Corrosion Test	ion Test	Stability	of Fuel*1
of Formulation	HC Naphtha	Ether	Ethanol	APA	Alcohol I P A N	NBA	I B A	Kind	Loading/Fuel (wt%)	Loading/Fuel (wt%)	Evaluation Temp. (°C)	Evaluation Time (hr)	Evaluation Evaluation Weight Loss Temp. (°C) Time (hr) Rate (%)	Room Temp. 25°C	Low Temp. -10° C
EIB15-E	80.0	5.0	5.0	:		-		None		0.0	06	24	32		100
	79.9	9.0	0.				0 :01	None			.06	54	0	90	201
	80.0 79.5	2.0	2.0				9.0	None		0.0	120	24	000	100	0 0
	79.4	. 0					6.6	None			120	24	0	0	0
ЕІВ15-Е-Ме	79. 2 79. 4	5.0	5.0				9.9	Methanol	1.0 0.5	0.0	100	24 24	0	100	100
	78.8 79.0	4.9	4.9				6 6 6		1.5 0.8	0.0	120 120	24 24	00	100	100
	79.0	4.9 6.4	4.9 9.9				6.6 8.6		0.6 1.5	9.0 8.0	120 120	24	00	100	100
EIB15-E-PG	78.8 79.2	4.9 5.0	5.0				9.9	Propylene glycol	1.5 0.8	0.0	100	24 24	0	100	100
	77. 6 78. 2 78. 8	6.4 9.4 9.9	4. 4. 4. 9. 9. 9.				9.9.9		3.0 2.0 1.0	0.00	120 120 120	24 24 24	000	100	100
EIB15-E-DEK	79. 2 79. 6	5.0	5.0				9.9	Diethyl ketone	1.0	0.0	100	24 24	0	100	100
	78.8 79.4 79.6 77.5	4.7.7.4.4 0.088	4.7.7.4.4 0.088		<u> </u>		9.9 9.9 10.0 9.7		3 5 5 5 7 2 2 3 2 3 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	120 120 120 120 120	24 24 24 24 24	00000	1000	100 100 100 0
EIB15-E-GM	78.8 79.0	4.9	4.9				9.9	Methyl acetate	1.5	0.0	100	24	0	100	100
	77.6 79.0 79.2 78.2	4,4,7;4, 0,0,8	4, 4, 7, 4, 9 9 9 9 8				6.69 6.69 7.69 7.69		3.0 2.7 2.6 3.0	00000	120 120 120 120 120	2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	1000 1000 1000 1000	100 100 100 0
EIB15-E-PA	79. 5 79. 7	5.0	5.0				9.9 10.0	Propional aldehyde	0.6	0.0	100	24 24	0	100	100
	79.2 79.5 79.5	5.0 5.0	0 0 2 0 0 2 0 0				6.6.6.		1.0 0.4 0.2	0.0 0.2 0.4	120 120 120	24 24 24	0	100 100 100	100
							1			*	100 →Perf	*1 100 →Perfectly phase-solved,	0	→Layer-separated	rated

*1 100 →Perfectly phase-solved, 0 →Layer-separated

Designation		Fuel	కె	ositio	mposition (wt%)			Addi	Additive	Water	Aluminu	Aluminum Corrosion Test	ion Test	Stability	Stability of Fuel*1
	오	Ether			Alcohol			Kind	Loading/Fuel	Loading/Fuel	ப்ப	Evaluation Evaluation	Weight Loss	Rog s	ı —
ulation	Naphtha		_	NPA	IPAN	NBA	I B A		(WLW)	(ML%)	(C)	ime (nr)	Kate	2 62	3 01-
E1875	20.0	5.0	35.0				40.0 39.9	None None		0.00 0.100	366	24 2	8 8 8 8	8 8 9	809
	70.0	o. C	34. 9				39.9	None		0. 2	06	5 7	>	100	001
	20.0		35.0				40.0	None		0.0	120	24	100	100	100
	19. 8 19. 8	5.0 4.9	34. 7				39. 6 39. 5	None		1.0	120 120	24 24	0 0	001	100
ЕІВ75-Ме	19.7	6. 4. 9. 9.	34.5				39. 4 39. 4	Methanol	1.5	0.0	100	24	0 0	100	100
	19.6		34.3				39. 2		2.0		120	24	0	100	100
	19.6 19.6	4.9	34.3				39. 2 39. 2		1.5	0.5	120 120	24 24	00	001	100
EIB75-E-E G	19.6		34.3				39. 2 39. 4	Ethylene glycol	2.0	0.0	100	24 24	00	100	100
	20.0 19.2 19.3	0.4.4.	33. 8 33. 8				40. 0 38. 4 38. 6		4.0	0.0	120	24	000	100	100
	19.4		34.0				38.8				120	5.4	o	<u> </u>	<u>8</u>
EIB75-MEK	19.4 19.9	4.9	34.0 34.8				38.8 39.8	Methyl ethyl ketone	3.0 0.3	0.0	100	24 24	0 0	100	100
	19. 0 19. 6 19. 8	8.4.4 0.0	33. 3 34. 2 34. 6			<u>-</u>	38. 0 39. 1 39. 5		5.0 2.0 0.2	0.0 0.2 1.0	120 120 120	24 24	000	100	100 100 100
EIB75-E-GM	19. 2 19. 5	4.8	33. 6 34. 2		-		38. 4 39. 1	Methyl formate	4.0	0.0	100	24 24	0	100	100
	18.4 19.1 19.4	4. 4. 8 9. 9. 9	32. 2 33. 5 34. 0				36.8 38.3 38.8		8.0 4.0 2.0	0.0 0.3 1.0	120 120 120	24 24 24	000	100 100 100	100 100 100
EIB75-AA	19.8 19.9	5.0	34.7				39. 7 39. 8	Acetaldehyde	0.8	0.0	100	24 24	00	100	100
	19.8	5.0	34. 7 34. 8				39. 6 39. 7		0.4	0.0	120 120 120	24 24 24	000	001	100
	?		;		i							;	,		

Designation		Fu	e	Composition	on (wt%)	(%	\prod	Additive	ive	Water	Aluminu	Aluminum Corrosion Test	ion Test	Stability of Fuel*	of Fuel*1
Of Formilation	Narhtha	Ether	Į.	NPA	A I cohol	_ Z	IBA	Kind	Loading/Fuel	Loading/Fue	Evaluation Evaluation	Evaluation Time (hr)	Weight Loss	Room Temp, Low Temp.	Low Temp. -10°C
	40.0 39.9	30.0				10.0	00	None	(1)		8 8				100
	40.0	30.0			10.0	10.0	10.0	None			120	24	100	100	100
	38.9	29. 2			9.7	9.7	9.7	None		2.7	120	24	00	100	00
	0.00	4.5. 1					-				3	5	>	,	·
PNB30-E-Me	39. 6 39. 7	29. 7 29. 8			9.9	9.9	9.9 9.9	Methanol	1.0 0.4	0.0	100	24 24	00	100	001
	39.4	29. 6							1.5		120	24	0	100	100
	39.5	29.6									120	24	0 0	100	00 0
	38.5 38.0	28.9 28.9			9.6	9.6	9.69 9.59		2.00	3.0	120	24	000	800	000
PNB30-E-E G	39. 2 39. 5	29. 4 29. 6			9.6	8.6	9.6	Ethylene glycol	2.0	0.0	001	24	0	100	100
	39.0	29.3									120	24	0	100	100
	39.3 39.5	29. 5 29. 6			8 6 6 6	ထော တံတ်	တ တ တ် တ်		1.5	0.0 0.3 0.3	120	24 24	0	100	000
PNB30-E-Ac	39.9 39.9	29.9 29.9			10.0	10.0	10. 0 10. 0	Acetone	0.2	0.0	100	24 24	0	100	100
	39.9 39.9	29. 9 29. 9			10.0	10.0	10.0		0.2	0.0	120	24 24	00	100	100
	38. 1 37. 6	28. 6 28. 2			9.5	9.5	9.5		3.0	3.0	120 120	24 24	00	100	100
PNB30-E-GM	39.4 39.5	29. 6 29. 6			6.6	9.9	9.9 9.9	Methy! formate	1.5	0.0	100	24 24	0	100	100
	39.0	29.3									120	24 24	00	100	100
	39.6	29.7			6.6	9.9	6.6		0.6	0.3	120	24	0 0	100	100
	37.7 37.0	28.3									120	24 24	0	100	30
PNB30-E-BA	39.8 39.9	29.9 29.9			10.0	10.0	10.0	Butylaldehyde	0.4	0.0	100	24 24	00	100	100
	39.8 39.8	29.9 29.9			10.0	10.0	10.0		0.5	0.0	120	24 24	0	100	100 100
				1						*	100 →Per	fectly pha	*1 100 →Perfectly phase-solved, 0 →Layer-separated	→Layer-s	eparated

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Designation		Fuel	ဒ	mposition (wt%)	1 (Wt%)			Additive	tive	Water	Alumin	Aluminum Corrosion Test	ion Test	Stability of Fuel*1	of Fuel*1
of Formulation	HC Narohtha	Ether		APAN		NRA	IRA	Kind	Loading/Fuel	Loading/Fuel	Evaluation	Evaluation Time (hr)	Weight Loss Rate (%)	Room Temp. Low Temp	Low Temp. -10° C
PNB15-E	80. 0 79. 9	5.0			+	5.0		None None		0.0		120 120		100	001
	80.0	5.0						None			120	24	100	100	100
	79.6	5.0			5.0			None		0.5	120	24 24	00	000	00
PNB15-E-Me	79.4	5.0			5.0	5.0	5.0	Methanol	0.8	0.0	100	24 24	0 0	100	100
	78.8	6.9							1.5		120	24	00	001	100
	79.4	5.0			0.6	5.0	0.6		. O C	. 6. 6. 5. 6. 6.	120	24		001	100
	77.0	8.4									120	24	0	001	0
PNB15-E-PG	77. 6 78. 6	4.9			4.9	4.9	4.9	Propylene glycol	3.0	0.0	100	24 24	0	100	100
	76.8	8 0			8 6	8 6	4. 8 0		0.4.0	0.0	120	24	00	100	100
					. 4. . 9		. 4. 0.				120	24	0	001	001
PNB15-E-MPK	79.8 79.8	5.0			5.0	5.0	5.0 5.0	Methyl-n-propyl ketone	0.3	0.0	001	24 24	0	100	100
	79. 6 79. 7	5.0			5.0	5.0	5.0		0.5	0.0	120	24 24	00	100	100
	76. 4 75. 4	4.8			4.8	4.8	4.8		4.0 5.0	0.5	120	24 24	00	001	001
PNB15-E-SM	78.8 79.0	4.9			4.9	4.9	4.9	Methy! acetate	1.5	0.0	100	24	0	100	100
	75. 2						7.4		6.0		120	24	00	001	100
	79.0	4.9			0 6	6 4.	6.4		0.0	7 6 6	120	24	000	00 5	00 9
	74.8		•		4.7		4. 6 6. 6		7.0		120	24 24	00	001	30
PNB15-E-AA	79.8 79.8	5.0			5.0	5.0	5.0	Acetaldehyde	0.3	0.0	100	24 24	0 0	100	100
	79.6	5.0			5.0	5.0	5.0		0.5	0.0	120 120	24 24	0	100	100
						1				*	*1 100 →Perfectly phase-solved,	ctly phase-		0 →Layer-separated	rated

Designation		Fue	l Composition	ion (wt%)			Addi	Additive	Water	Alumin	Aluminum Corrosion Test	sion Test	Stability of Fuel*1	of Fuel*1
of Cormulation	HC Parktho	Ether	C+honol N D A	Alcohoi	a Z	A M I	Kind	Loading/Fuel	Loading/Fuel	Evaluation	Evaluation Time (hr)	Weight Loss Rate (₹)	Room Temp Low Temp.	Low Temp.
PNR75-F		1	_1	-	25.	25.0	None	/u-w	0.0		120	100	001	100
	20.0	5.0		24.9	25.0 24.9	25. 0 25. 0	None None		0.1 0.2	80	120 120	92	100	001 1000
	20.0			25.0	25.0	25.0	None		0.0	120	24	100	100	100
	17.7	4 5 6 6 7 8 8 9 8 9 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 <th></th> <th>22. 1 22. 0</th> <th>22. 1 22. 0</th> <th>22. 1 22. 0</th> <th>None None</th> <th></th> <th>11. 7 12. 1</th> <th>120 120</th> <th>24 24</th> <th>00</th> <th>100</th> <th>00</th>		22. 1 22. 0	22. 1 22. 0	22. 1 22. 0	None None		11. 7 12. 1	120 120	24 24	00	100	00
PNB75-E-Me	19.8	5.0		24.8 24.8	24.8 24.8	24.8 24.8	Methanol	1.0	0.0	100	24 24	0 0	100	100
	19.6			24.5	24.5	24.5			0.0	120	24	0 0	100	100
	19.7			24. 6	24. 6	24.6				120	24	0	001	100
	17.3	6 4 4		21.6	21.6	21.6		3.0		120	24	00	100	0 0
PNB75-E-E G	19. 2 19. 6	4.8		24.0 24.6	24. 0 24. 6	24.0 24.6	Ethylene glycol	4.0	0.0	100	24 24	0 0	100	001
	19.0			23.8	23.8	23.8		5.0	0.0	120	24	0	100	100
	19.3 19.6	4.8		24. 2 24. 5	24. 2 24. 5	24. 2 24. 5		3.0		120 120	24	00	100	100
PNB75-E-MEK	19.9	5.0		24.9 24.9	24.9 24.9	24.9 24.9	Methyl ethyl ketone	0.3 0.1	0.0	100	24 24	00	001 100	100
	19.9	5.0		24.9	24.9 24.9	24.9 24.9		0.5	0.0	120 120	24 24	00	100	100
	17.1	4.3		21.3	21.3	21.3 21.0		3.0	11.7	120 120	24	00	001	100
PNB75-E-GE	19.2 19.6	4.9		24.0 24.5	24.0 24.5	24. 0 24. 5	Ethyl formate	4.0	0.0	100 100	24 24	0 0	100	001
	18.8			23.5	23.5	23.5		6.0	0.0	120	24	00	100	001
	19.4	4. 4. 8. 9.		24. 2 24. 7	24. 2	24. 2		1.0	0.4	120	24	00	100	001
	16.9 16.6			21. 1 20. 7	21. 1 20. 7	21. 1 20. 7		5.0	11.7	120	24 24	00	100	000
PNB75-E-PA	19.9	5.0		24.9	24.9 24.9	24.9 24.9	Propion aldehyde	0.3	0.0	100 100	24 24	0 0	100	100
	19.9	5.0		24.9 24.9	24.9 24.9	24.9 24.9		0.5	0.0	120 120	24	00	100	100
									*	100 →Perfe	ectly phase	*1 100 →Perfectly phase-solved. 0 →Layer-separated	Layer-sepa	rated

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st Stability of Fuel*1	Room Temp	4	100 100		100 0	100 100 100 100	100 100		100 100	100 100 100 100 100 100	100 100	100 100		100 100	100 100 100 100 100 100		100 100 100 100	100 100
Aluminum Corrosion Test	Weigh	gg gg	 0	100	00	00	00		00	000	0 0			00	000		0 0	
ninum Cor			120	24	24	24	24	24	24	24 24	24	24 4	24 4 5 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	24	24 24	24	24 24	24
	Evalu	١	00 00 	120	120	100	120	120	100	120 120 120	100	120	120	100	120	120	100	120
Water	Loading/Fuel	(WE%)	0.0	0.0	3.9	0.0	0.0	1.0	0.0	0.0 0.6 1.0	0.0	0.0	3.9	0.0	0.0	3.9	0.0	0.0
Additive	Loading/Fuel	(WE%)				1.5	2.5	0.5	2.0	5.0 2.0	3.0	1.0	6.0 7.0	1.5	6.0 1.0	7.0 8.0	0.6	1.0
Addi	Kind	1	None None	None	None None	Methanol		-	Ethylene glycol		Acetone			Methy! formate			Butylaidehyde	
			10.0	10.0	9.6 9.6	9.9	8. 6 8. 6	9.6	9.8 9.9	9.5 9.6 9.7	9.7	9.6	9.0	9.9	9.4 9.9 9.9	. 8. 8. 9. 8. 8.	9.9	6.6
(NBA																
tion (wt%)	Alcohol	IPA	10.0	10.0	9.6 9.6	9.9	8.6	9.6	9.8 9.9	9.5 9.6 9.7	9.7	9.6	9.0	9.9 9.9	9.4	8.8	9.9	9.9
Compositi		NPA																
Fuel Com		Ethanol	10.0	10.0	9.6 9.6	6.6 9.9	8.0	6.6	9.8	9.5 9.6 9.7	9.7	9.6	9.0	9.9	9.4	6.8	9.9	9.9
교	Eth	- 1	30.0	30.0	28.8	29.6	29.3	29.6	29.4 29.6	28.5 28.9 29.1	29.1	28.8	27.0 26.6	29.6 29.6	28.2	26.7 26.3	29.8 29.9	29.7
	오	Naphtha	40.0 39.9	40.0	38.4	39.4 39.6	39.0	39.4	39.2 39.4	38.0 38.6 38.8	38.8	38.4 39.5	36.0 35.5	39.4 39.5	37.6	35.6 35.1	39.8 39.8	39.6
Designation	٥f	Formulation	EIPP30-E			EIPP30-E-Me			EIPP30-E-EG		EIPP30-E-Ac			EIPP30-E-GM			EIPP30-E-BA	

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N.B.A Note Note 0.0 120 120 120 100		TE A	Fuel Com	Composition	ion (wt%)		Addi	Additive	Water Loading/File	Ě	Aluminum Corrosion Test	Weight Loss	Stability of Fuel*	of Fuel*1
5.0 None 0.0 80 120 9 100 5.0 None 0.1 80 120 24 0 100 5.0 None 1.0 1.20 24 0 100 5.0 Northanol 1.0 1.0 24 0 100 4.9 Methanol 1.0 0.0 1100 24 0 100 4.9 Propylene 2.5 0.0 120 24 0 100 4.9	Naphtha DBE Ethanol NPA	NP.	NP.		\vdash	JBA	Kind	Loading/rue! (wt%)	(wt%)		Time (hr)	Rate (%)	25°C	-10° C
5.0 None 0.0 120 24 100 100 5.0 None 1.0 1.0 120 24 100 100 5.0 None 1.0 1.0 120 24 0 100 4.9 2.0 0.0 1.0 1.0 24 0 100 4.9 1.0 0.0 0.0 1.20 24 0 100 4.9 1.0 0.0 0.0 1.20 24 0 100 4.9 1.0 0.0 0.0 1.0 24 0 100 4.9 1.0 0.0 0.0 1.0 24 0 100 4.9 1.0 0.0 0.0 1.0 24 0 100 4.9 1.0 0.0 0.0 1.0 24 0 100 5.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <td>5.0 5.0 5.0 5.0</td> <td></td> <td></td> <td></td> <td>5.0</td> <td>-</td> <th>None None</th> <td></td> <td>0.0 0.1</td> <td>08 08</td> <td>120 120</td> <td>0</td> <td>100</td> <td>100</td>	5.0 5.0 5.0 5.0				5.0	-	None None		0.0 0.1	08 08	120 120	0	100	100
5.0 Methanol 1.0 0.0 100 24 0 100 5.0 4.9 2.0 0.4 100 24 0 100 4.9 4.9 1.0 0.5 0.4 120 24 0 100 4.9 4.9 0.5 0.0 1.0 24 0 100 4.9 4.9 0.5 0.0 0.0 120 24 0 100 4.9 4.9 0.0 0.0 120 24 0 100 4.9 4.9 0.0 0.0 120 24 0 100 4.9 4.9 0.0 0.0 120 24 0 100 5.0 Actor 0.0 0.0 120 24 0 100 5.0 Actor 0.0 0.0 120 24 0 100 5.0 Actor 0.0 0.0 0.0 120 24 </td <td>80.0 5.0 5.0 79.4 5.0 5.0 79.2 5.0 5.0</td> <td></td> <td></td> <td></td> <td>5.0</td> <td></td> <th>None None None</th> <td></td> <td>0.0 0.8 1.0</td> <td>120 120 120</td> <td>24 24 24</td> <td>100 0 0</td> <td>100</td> <td>0 0 001</td>	80.0 5.0 5.0 79.4 5.0 5.0 79.2 5.0 5.0				5.0		None None None		0.0 0.8 1.0	120 120 120	24 24 24	100 0 0	100	0 0 001
4.9 Propylene 2.0 0.0 120 24 0 100 4.9 Propylene 2.5 0.6 120 24 0 100 4.9 glycol 1.5 0.0 100 24 0 100 4.9 glycol 1.5 0.0 1.20 24 0 100 4.9 ketone 2.0 0.4 120 24 0 100 5.0 ketone 0.2 0.2 120 24 0 100 5.0 ketone 0.2 0.0 120 24 0 100 5.0 ketone 0.2 0.0 120 24 0 100 5.0 0.8 0.2 120 24 0 100 5.0 0.8 0.2 120 24 0 100 4.9 Methyl 1.2 0.0 120 24 0 100 5.0 acetate 0.8 0.2 100 24 0 100 <td< td=""><td>2 5.0 5.0 3 5.0 5.0</td><td></td><td></td><td></td><td>5.0</td><td></td><th>Methanol</th><td>1. 0 0. 5</td><td></td><td>100</td><td>24 24</td><td>0 0</td><td>100</td><td>100</td></td<>	2 5.0 5.0 3 5.0 5.0				5.0		Methanol	1. 0 0. 5		100	24 24	0 0	100	100
4.9 Propylene 2.5 0.0 100 24 0 100 4.9 gfycol 1.5 0.3 100 24 0 100 4.9 4.9 2.0 0.4 120 24 0 100 4.9 1.5 0.0 0.4 120 24 0 100 5.0 ketone 0.2 0.7 120 24 0 100 5.0 ketone 0.2 0.0 120 24 0 100 5.0 ketone 0.2 0.0 120 24 0 100 5.0 0.2 1.0 0.2 120 24 0 100 4.9 Methyl 1.2 0.0 120 24 0 100 5.0 acetate 0.8 0.2 120 24 0 100 5.0 acetate 0.8 0.2 120 24 0 100	4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9	.	444	ਧਾ ਧਾ ਧਾ		··		2.0 0.5		120 120 120	24 24 24	000	100 100 100	100 100 100
4.9 4.9 2.0 0.4 120 24 0 100 4.9 1.5 0.5 120 24 0 100 5.0 Ketone 1.5 0.5 120 24 0 100 4.9 Ketone 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 4.8 4.0 0.0 120 24 0 100 4.9 Methyl 1.2 0.5 120 24 0 100 4.9 Methyl 1.2 0.0 100 24 0 100 4.9 A.7 5.0 0.0 120 24 0 100 4.9 A.7 5.0 0.0 120 24 0 100 4.9 1.0 0.0 1.0 24 0 100 4.9 1.0 0.0 0.0 120 24 0 100 4.9 1.0 0.0 0.0 <td>0 4.9 4.9 6.9</td> <td>6</td> <td>7</td> <td>14. 4.</td> <td>4.9</td> <td> -</td> <th>Propylene glycol</th> <td></td> <td></td> <td>100</td> <td>24 24</td> <td>00</td> <td>100</td> <td>100</td>	0 4.9 4.9 6.9	6	7	14. 4.	4.9	 -	Propylene glycol			100	24 24	00	100	100
4.9 Diethyl 2.0 0.0 100 24 0 100 5.0 ketone 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 4.8 4.0 0.8 120 24 0 100 4.7 5.0 1.0 120 24 0 100 5.0 acetate 0.8 1.0 120 24 0 100 4.9 Methyl 1.2 0.0 100 24 0 100 4.9 2.0 0.8 0.2 120 24 0 100 4.9 1.0 0.8 0.2 120 24 0 100 4.7 5.0 0.0 1.0 24 0 100 5.0 Propion 0.5 0.0 120 24 0 100 5.0 aldehyde 0.2 <	76.8 4.8 4.8 4.9 4.9 4.9 4.9 4.9 4.9 4.9	& O O	4 4 4	कं कं कं	& 6 6					120 120 120	24 24 24	000	100	100 100 100
4.9 3.0 0.0 120 24 0 100 5.0 0.8 0.2 120 24 0 100 4.8 4.0 0.8 120 24 0 100 4.9 Methyl 1.2 0.0 100 24 0 100 4.9 3.5 0.0 120 24 0 100 4.9 2.0 0.2 120 24 0 100 4.9 2.0 0.2 120 24 0 100 4.9 2.0 0.0 0.2 120 24 0 100 4.9 1.0 0.5 1.0 24 0 100 4.7 5.0 0.8 120 24 0 100 5.0 aldehyde 0.2 0.0 100 24 0 100 5.0 aldehyde 0.2 0.0 120 24 0 100 5.0 0.8 0.0 0.0 120 24 0 100	4 4.9 4.9 4.9 6.5.0 5.0 5.0	9 0			60	 	Diethyl ketone			100	24	00	100	100
4.8 4.0 0.5 120 24 0 100 4.9 Methyl 1.2 0.0 100 24 0 100 4.9 3.5 0.0 100 24 0 100 4.9 3.5 0.0 120 24 0 100 4.9 2.0 0.2 120 24 0 100 4.7 5.0 0.2 120 24 0 100 4.7 5.0 0.8 120 24 0 100 4.7 5.0 0.8 120 24 0 100 4.7 6.0 1.0 120 24 0 100 5.0 Propion 0.5 0.0 100 24 0 100 5.0 aldehyde 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0	6 4.9 4.9 4.9 2 5.0 5.0 5.0 5.0	9 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7			60	·				120 120	24	00	100	100
4.9 Methyl 1.2 0.0 100 24 0 100 4.8 3.5 0.2 100 24 0 100 4.9 2.0 0.2 120 24 0 100 4.7 1.0 0.2 120 24 0 100 4.7 5.0 0.8 120 24 0 100 4.7 5.0 0.8 120 24 0 100 4.7 6.0 1.0 120 24 0 100 5.0 Propion 0.5 0.0 1.0 100 100 5.0 Propion 0.5 0.0 100 24 0 100 5.0 aldehyde 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 0.4 120 24 0 100<	2 4.8 4.8 4.8 2 4.7 4.7 4.7	7 4.								120 120	24	00	100	100
4.8 3.5 0.0 120 24 0 100 4.9 1.0 0.2 120 24 0 100 4.7 5.0 0.5 120 24 0 100 4.7 5.0 0.8 120 24 0 100 5.0 Propion 0.5 0.0 1.0 24 0 100 5.0 aldehyde 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.2 0.4 120 24 0 100	0 4.9 4.9 4.9 2 5.0 5.0 5.0	9 4.4			+		Methy! acetate			100	24	0 0	100	100
5.0 Propion 0.5 0.0 100 24 0 100 5.0 aldehyde 0.2 0.3 100 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.8 0.0 120 24 0 100 5.0 0.2 0.4 120 24 0 100	22 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	866677	ਚਾਂ ਚਾਂ ਚਾਂ ਚਾਂ	यं यं यं यं यं	8 6 6 7 7					120 120 120 120 120	2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00000	100 100 100 100	100 100 100 0
0 0.8 0.0 120 24 0 100 0 0 0 0.2 0.4 120 24 0 100	6 5.0 5.0 5.0				-		Propion aldehyde			100	24 24	0	100	100
	5 5.0 5.0 5.0	00	വ വ	വ്വ	00					120 120	24	00	100	100

Temp. Low Temp. C -10° C 0 →Layer-separated Stability of Fuel*1 001 001 888 00 8 8 88 888 001 888 001 88 001 888 100 100 100 0000 800 0000 100 100 0000 100 80 001 800 100 100 100 Room I Aluminum Corrosion Test Weight Loss →Perfectly phase-solved, 8 5500 9000 00 000 00 000 00 00 00 000 00 00 Evaluation (<u>F</u> 120 120 120 24 Time Evaluation Tem(6:C) 120 120 120 001 120 120 120 100 120 120 120 000 120 120 000 120 120 120 000 120 120 80 80 80 8 - Loading/Fuel (wt%) 0.0 0.1 0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 20 0 10 0 0 00 00 Loading/Fuel (wt%) 10.0 6.0 3.0 10.0 4.0 2.0 2.0 3.0 2.0 0.6 4.0 3.0 5.0 3.0 0.5 Additive Acetaldehyde Methyl ethyl ketone Ethylene glycol Methyl formate Methanol None None None None None 000 0 9 9 9 **в** 4 о 2 4 0 ကတ ∞ ~ დ 4 အခ ი ი $\infty \infty$ 25.55 24.24. 24. 24. 24.24. 24. 24. 23.23 24. 23. 24.24 23. 24. 24. Fuel Composition (wt%) 24.3 24.4 24.6 24. 0 24. 4 24.3 24.4 22. 5 23. 9 24. 3 006 0 9 9 ള വ 0 4 5 ი ი ∞ ~ 6 $\infty \infty$ 25. 24. 24. 22. 23. 24. 24. 25. 24. 23. 24. N P. നമെ 0 9 9 25. 24. 24. 25. 24. 24. 24. 24. 24. 24. 24. 24. 22. 23. 24. 24. 24. 23. 24. 24. 24. 22. 23. 24. 24. 24. 24. 5.0 5.0 5.0 5.0 4.9 4.9 4.9 4.9 4.9 5.0 4.9 4.9 4.5 5.0 4.8 4.5 4.8 5. 5. HC Naphtha 000 0 ~ ~ 450 2 4 0 0 & တ တ 2 10 20. 20. 20. 19. .61 19. 19. 19. 18. 19. . 19. 69 69 19. 19. 18. 19. 19. 19. 69 19. 19. Formulation Des i gnat i on EIPP75-E-EG 31PP75-E-MEK SIPP75-E-Me SIPP75-E-GM EIPP75-E-AA φ EIPP75-E

Fig. 33

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Low Temp. -10°C Stability of Fuel*1 100 100 100 0 100 100 0000 001 Room Temp. 25°C 100 00 100 0 100 100 100 Evaluation Evaluation Weight Loss Temp. ($^{\circ}$ C) Time (hr) Rate (%) Aluminum Corrosion Test 0 0 0 0 0 0000 0000 0000 120 Loading/Fuel (wt%) Water 0.0 0.1 0.2 0.4 0.0 0.1 0.2 0.4 0.0 0.1 0.2 0.4 о О 0000 ö Loading/Fuel (wt%) 2.0 1.0 2.0 3.0 2.0 1.5 4.0 5.0 1.5 1.0 3.0 4.0 വ വ ö Ö Additive Ethylene glycol Butylaldehyde Ethyl formate Methanol Acetone None None None ΙР Composition (wt%) NPA Alcohol 0000 0006 0 0 0000 0000 1 1 2 2 1 1 2 2 2222 $\dot{\circ}$ $\dot{\circ}$ 7222 Fuel HC Naphtha 98.0 97.9 97.8 97.6 96. 0 96. 4 93. 9 92. 7 2 2 0 6 8 7 9002 96. 96. 95. 96. 96. 94. 97. 97. Designation of Formulation E2-Me E2-EG E2-BA **E**2

*1 100 →Perfectly phase-solved, 0 →Layer-separated

Fig. 35

< Ether Nonloaded Type >

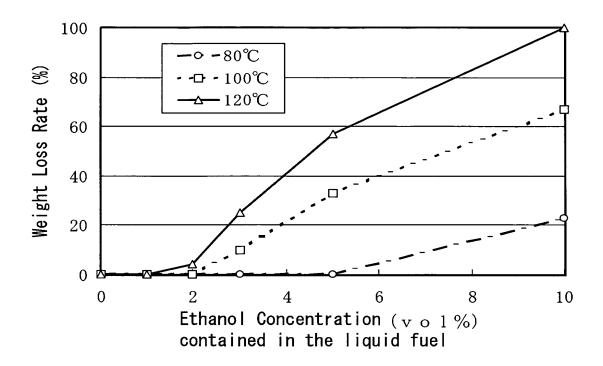
Danismatian						Alu	ninum	Corro	sion	Inhibi	tor				-	
Designation of	Water	M	ethano	o l	(alycol			(etone			Esters	3	Α	dehyd	es
Formulation	Added	Added	Reduced	Low Temp. Stability												
E 2	0	0	-	-	0	-	-	0	0	0	0	0	0	0	0	0
E 1 0	0	0	-	-	0	_	-	0	0	0	0	0_	0	0	0	0
E 2 0	0	0	_	_	0	_	-	0	0	0	0	0	0	0	0	0
E 5 0	0	0		-	0	-	-	0	0	0	0	0	0	0	0	0
IN40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-
IN15	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-
IN75	0	0	0	_	0	0	-	0	0	-	0	0	-	0	0	-
EIB40	0	0	0	-	0	0	1	0	0	0	0	0	0	0	0	0
EIB15	0	0	0	0	0	0		0		0	0	0	0	0	0	-
EIB75	0	0	0	-	0	0	ı	0	0	_	0	0	_	0	0	-
PNB30	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	_
PNB15	0	0	0	0	0	0	1	0		0	0	0	0	0	0	-
PNB75	0	0	0	0	0	0	_	0	0	0	0	0	0	0	0	-
EIPP30	0	0	0	-	0	0	_	0	0	0	0	0	0	0	0	-
EIPP15	0	0	0	-	0	0	_	0	0	0	0	0	0	0	0	-
EIPP75	0	0	0	-	0	0	-	0_			0	0	-	0	0	

< Ether loaded Type >

Dooignotion						Alu	minum	Corro	sion	Inhibi	tor					
Designation of	Water	M	ethane	ol l	(Glycol	S	K	(etone	s		Esters	S	Α	dehyd	es
Formulation	Added	Added	Reduced	Low Temp. Stability	Added	Reduced	Low Temp. Stability	Added	Reduced	Low Temp. Stability	Added	Reduced	Low Temp. Stability	Added	Reduced	Low Temp. Stability
E 1 0 - E	0	0	-	-	0	_	-	0	0	Ô	0	0	0	0	0	0
E 2 0 - E	0	0	-	-	0	-	-	0	0	0	0	0	0	0	0	0
E 5 0 - E	0	0	-		0	_	_	0	0	0	0	0	0	0	0	0
IN40-E	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	
IN15-E	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	_
IN75-E	0	0	0	-	0	0	_	0	0		0	0	-	0	0	
E I B 4 0 - E	0	0	0	- 1	0	0	- "	0	0	0	0	0	0	0	0	0
E I B 1 5 - E	0	0	0	0	0	0		0	0	0	0	0	0	0	0	
E I B 7 5 - E	0	0	0	-	0	0	_	0	0	~	0	0	_	0	0	
PNB30-E	0	0	0	0	0	0	-	0	0	0	0	0	0_	0	0	-
PNB15-E	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	_
PNB75-E	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	_
EIPP30-	0	0	0	-	0	0	_	0	0	0	0	0	0	0	0	_
E I P P 1 5 -	0	0	0	-	0	0	_	0	0	0	0	0	0	0	0	
EIPP75-	0	0	0	-	0	0	-	0	0	-	0	0		0	Ö	_



Fig. 36



Treatment Time 240Hr

Ethanol Concentrati	on (vol. 1%)	0	1	2	3	5	10
10 ' 1 1 1	80℃	0	0	0	0	0	23
Weight Loss	100℃	0	0	0	10	33	67
Rate (%)	120℃	0	0	4	25	57	100

Designation			-uel Compos	Fuel Composition (wt%)	(9)		Water	Alumin	Aluminum Corrosion Test	on Test
of	윘		Y	Alcohol			Loading/Fuel	Eval	Evaluation	Weight
Formulation	Naphtha	Ethanol	NPA	IPA	NBA	IBA	(wt%)	Temp. (°C)	Time (hr)	Loss Rate (%)
I PB75	25.0			35.0		40.0	0.00	100	24	100
	25.0			35.0		39.9	0.10	100	24	58
	25.0			34.9		39.9	0.15	100	24	0
	0 R O			35.0		40.0	00 0	120	24	100
	25.0			34.9		39.9	0.15	120	24	100
	24.9			34.9		39.9	0.30	120	24	0

Fig. 37